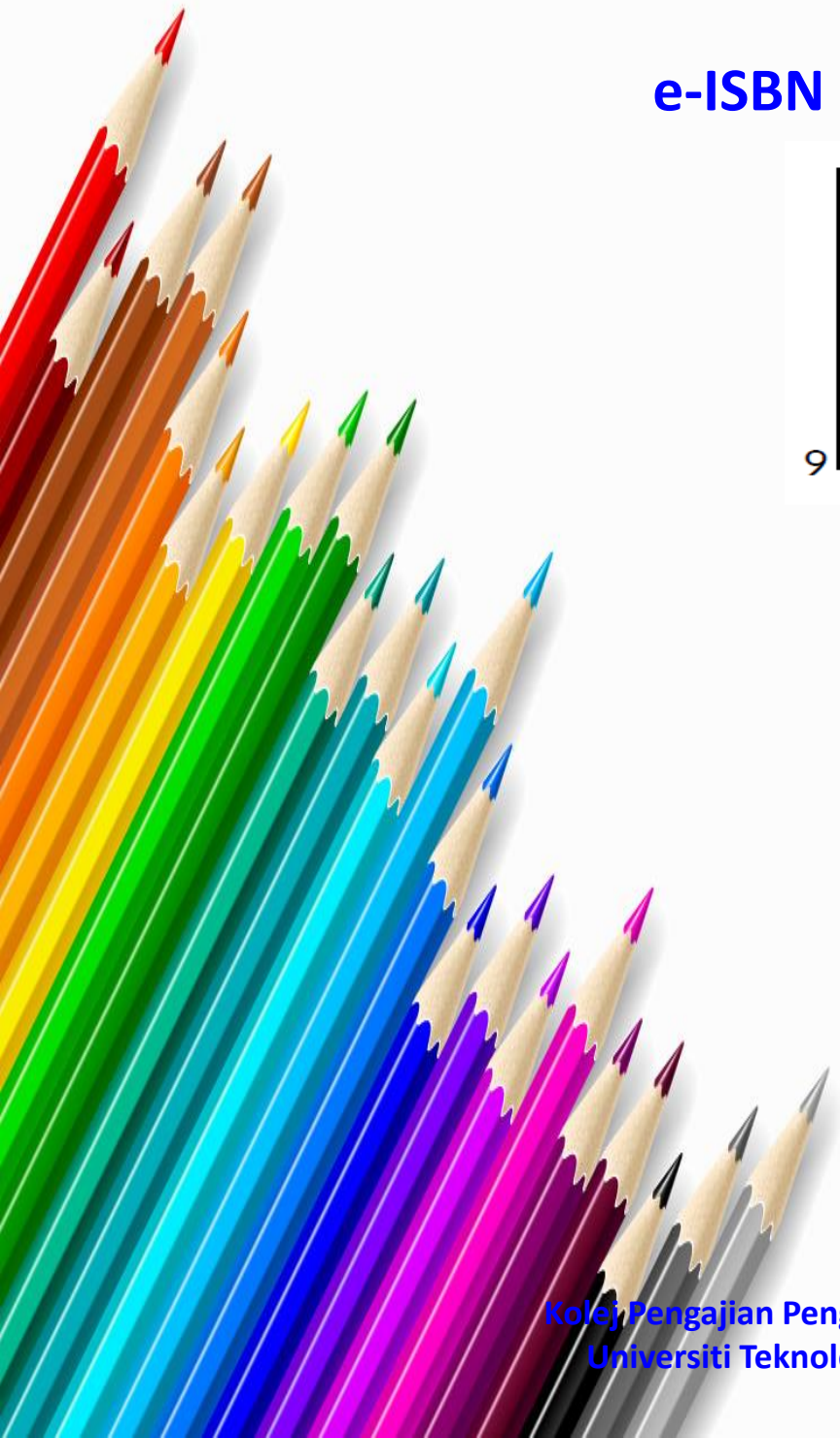


ENHANCING INNOVATIONS IN e-LEARNING FOR FUTURE PREPARATION

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SIG CS@e-Learning
Unit Penerbitan
Kolej Pengajian Pengkomputeran, Informatik & Media
Universiti Teknologi MARA Cawangan Pulau Pinang

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PREFACE

The committee of SIG CS@e-Learning would like to convey our sincere gratefulness to Almighty for the fifth issue contributed by educators from the Kolej Pengajian Pengkomputeran, Informatik dan Media (KPPIM), UiTM Penang Branch. Total of 18 academic articles have been received by the committee and all papers were accepted. The articles submitted shown that the contents and research framework discussed are adequate and the authors are recommended to enhance the paper by adding part of findings and discussions to be published in journals with SCOPUS, WOS or ERA indexed.

The theme of fifth volume is focusing on Enhancing Innovations in e-Learning for Future Preparation. E-learning has become an increasingly important learning and teaching mode in recent decades and has been recognized as an efficient and effective learning method. The rapidly rising number of Internet users with smartphones and tablets around the world has supported the spread of e-learning, not only in higher education and vocational training but also in primary and secondary schools. New trends in e-learning will be covered under artificial intelligence (AI), micro credentials, big data, virtual and empowered reality, blended learning, cloud e-learning, gamification, mobile learning, Internet of things, and online video.

The SIG CS@e-Learning will continue and actively participating in publication of academic articles in high impact of journal. Hopes KPPIM will achieve the highest numbers of academic articles published in high impact of journal, InsyaAllah.

Ts. Jamal Othman

Chief Editor

SIG CS@e-LEARNING

ENHANCING INNOVATIONS IN E-LEARNING FOR FUTURE PREPARATION

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REDUCING SPOON FEEDING IN EDUCATION

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ABSTRACT

Spoon-feeding is a common word which literally refers feeding one with a spoon or metaphorically implies denying someone the ability to think or act for oneself. It can also refer to someone receiving behavioral treatment that both pampers and compromises self-development. Methodologically, this behavioral impediment may impede individual learning and can discourage creativity and innovativeness among the learners in general, and undergraduates. On the other hand, with the introduction of online learning materials gaining center stage in tertiary education, the ever-ready contents at the click of the key serves like manna from heaven for many students at now. Being educators, they believe that independent learning should be proposed via creative teaching and learning, and this also will be examined in the paper through weekly teaching learning activities conducted during the semester. Providing learning materials online or in class may save both facilitators and learners time, cost, and effort. However, such a provision could result to in the restriction of the development of independent thinking and learning Educators' perspectives on spoon-feeding vary according to the research, and this is what this paper aims to investigate. Although providing lecture notes and learning materials to students has been an option, undergraduates can be trained to develop their own learning materials using technology and innovation through innovative and committed teaching by the facilitators themselves.

Keywords: *spoon-feeding, learning independent, provide, learning materials, cost*

Introduction

As more research is conducted to improve the quality of education, one problem is frequently highlighted: spoon-feeding. There are certain subjects like philosophy and literature that require the memorization of quotes. So, rote learning does come in handy for students at times. Treating your student like a baby, with a mind that needs to be filled with the teacher's knowledge, is what it means to spoon-feed them. Is there anything further we can learn? is the most crucial question a teacher must ask. Always yes is the response. As a result, spoon-feeding is never acceptable. Samah, Jusoff and Silong (2009), presented a unique perspective on the spoon-feeding culture. They characterized it as robbing your learner of the ability to think or act on their own. This means that you are not only not providing anything of value by spoon-feeding, but you are also denying your students of something essential. They voiced concern about digital learning aids that encourage this approach while stifling creative thinking. The writers, who were experienced educators, presented a solution, emphasizing the need of students contributing their own ideas to these tools.

In a spoon-feeding setting, the student will only digest the information without understanding it. The outcomes of spoon-feeding are often considered "regurgitation" by parents, students, and teachers. Since it is rewritten word for word, the content is unchanged. As the student's brain analyses the information, no progress is made, which causes education to stagnate. Ovens (2011) discovered that first-year university students preferred to be taught in a manner like how they had been "trained in school." When they encountered the concept of independent learning, he could feel their confusion. He was concerned that the students' right to choose their own educational decisions was drifting away. He concluded that they lacked the self-assurance to use their own knowledge.

Spoon-feeding is also convenient because preparation from semester to semester only requires minimal updates and changes (Samah, 2009). During a class, a teacher can explain exactly what he or she wants at the speed that the instructor wishes to teach. Students understand that all they need to do is take copious notes, memorize the content, and perhaps pass tests with a fair grade (Dehler, 2014). As a result, students become passive learners who do not take charge of their own education. They lack the will to learn the information and will soon forget much of what they learned once the course is done. By the time students graduate, they should have reached a level of deeper understanding where they may take ownership of their education. A teacher can create the groundwork for a lifetime of independent thinking by using creative teaching, a student-centered learning environment, and not spoon-feeding.

Advantages and Limitations of Spoon Feeding in Education

A lot of lecturers enjoy spoon-feeding their students. This pedagogical approach places the teacher at the center of the classroom, while the students take on a passive position (Whitman & Fife, 1988). The students do slightly prefer it, though. According to Chhem (2000), this common incidence is caused by the lecturer's perception of spoon-feeding as one of the teaching strategies due to the following benefits:

- 1- A lecture is short and requires little preparation because the lecturer is an expert in the subject matter. A 'good' lecture prepared according to basic guidelines and delivered by a 'good' speaker remains one of the greatest instructional approaches.
- 2- A single lecturer can give course content to a big class of hundreds of students, lectures are affordable and cost effective.
- 3- Giving the answer to students' questions is good for the teacher's ego in most teaching scenarios, including lectures and other spoon-feeding situations, because he is viewed as the one who knows. Furthermore, the process is short and requires little time and commitment from the teacher.

However, there are disadvantages to spoon-feeding that could harm the students. Firstly, spoon-feeding merely encourages rote learning and does not encourage students' active participation. Second, feeding off others does not encourage self-directed learning and creativity. Finally, because they have not been taught how to do independent data searches, students lack initiative and problem-solving abilities. According to Etchison (1988), passive pupils will have this mentality where they will see themselves as empty bowls that need to be filled before pouring their knowledge back into an exam.

Methods for Reducing Spoon-Feeding and Improving Student-Centered Learning

Overall, there are several alternate methods to spoon-feeding that can promote independent learning.

1. Drew (1990) defined peer learning-teaching as "case studies, role playing, and student-led seminars" (McKay, 1997) enhance student participation and a student-centered teaching environment.
2. Asking and answering question techniques. Asking open-ended and varied questions encourages conversation. When possible, questions should not be answered directly.

Redirecting the question to another student to encourage greater engagement or asking probing questions can assist pupils in discovering the answers on their own.

3. Drew (1990) and McKay (1997) found that group inquiry classes and tutorial groups increased interaction with others. Smaller courses allow for more connection with the lecturer, and groups learn to actively participate in the learning process by working on projects as a group and learning together.
4. Designing assignments that demonstrate learning through claims to knowledge (Dehler, 2014) encourages students to reconstruct what they learned and understand to generate their own insights while attempting to transmit their learning.

Conclusion

Higher education institutions still use the lecture model, which often results in spoon-feeding students all the information they need to know in a passive learning environment. Teachers still deliver instruction in this way, either out of convenience or a lack of confidence in their charges. According to studies, it is possible to alter how students approach learning and to cut back on spoon-feeding to encourage independent thought. There are numerous strategies that can support the development of an engaging learning environment where students take charge of their own education. The most effective methods are those that stress active learning and a student-centered teaching approach.

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SELF-DRIVING CAR WITH ARTIFICIAL INTELLIGENCE (AI) TECHNOLOGY

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ABSTRACT

The autonomous vehicle technology is highly developed and ready for commercial deployment. The self-driving car is a type of autonomous vehicle that can drive autonomously based on Artificial Intelligence (AI). It is based on the use of sensors, actuators, sophisticated algorithms, machine learning systems, and robust processors. The software that autonomous vehicles use to operate is executed by sensors and actuators. Artificial Intelligence (AI) is crucial in operating the autonomous car systems. The National Automotive Policy 2020 (NAP 2020) aims to grow Malaysia's automotive sector through research and development of new technologies, especially in the fields of Next-Generation Vehicles (NxGV), Industrial Revolution 4.0 (IR 4.0), and Mobility-as-a-Service (MaaS). In this paper, we will focus on the application of AI in autonomous car system. We will also discuss the development of autonomous vehicles.

Keywords: *Artificial Intelligence, Self-Driving Car, Autonomous Cars, Tesla, Waymo*

Introduction of application

Artificial Intelligence (Ai) Technology

Artificial intelligence (AI) is when machines, particularly computer systems, simulate human intelligence processes. Expert systems, natural language processing (NLP), speech recognition, and machine vision are a few examples of specific AI applications. (Burns et al., 2023)

In general, AI systems function by consuming vast quantities of labelled training data, searching the data for correlations and patterns, and then using these patterns to forecast future states. In this way, an image recognition software can learn to recognize and describe items in photographs by looking at millions of examples, much as a chatbot trained on examples of text chats can learn to make lifelike exchanges with people. (Burns et al., 2023).

Self-Driving Car

Autonomous automobiles, often known as self-driving cars, can operate with little to no input from the driver. (Towards AI Team, 2022). Autonomous automobile is a vehicle that can sense its surroundings and operate without human intervention. A human passenger is not necessary to operate the car at any time or to be inside the vehicle at any time. An autonomous vehicle may travel anywhere a typical

vehicle can go and can perform every task that a qualified human driver can. The ability to observe a completely autonomous vehicle in action has long been a goal of many people. The term "Self-driving car" has recently gained popularity in the technology sector as a result of developments in artificial intelligence and computational resources. (Towards AI Team, 2022).

Due to safety features like assisted parking and braking systems, many vehicles on the road today are classified as semi-autonomous, and a select number are equipped with the capacity to drive, steer, brake, and park themselves. Technology for autonomous vehicles depends on GPS capabilities as well as sophisticated sensing systems that can identify lane boundaries, signs, and unanticipated obstructions. (Gringer, 2018). Even while the technology isn't currently flawless, it's anticipated to become more common as it advances. In fact, some experts believe that by 2025, up to half of all vehicles leaving global manufacturing lines will be autonomous. In anticipation of the day when this technology is widespread, legislation governing the use of driverless vehicles is already in place in dozens of states. (Gringer, 2018).

Several advantages are anticipated from autonomous vehicles, but increased road safety is likely to be the most significant. Since cars cannot get intoxicated or under the influence like human drivers do, the incidence of accidents involving impaired driving is projected to significantly decrease. (Gringer, 2018). Additionally, self-driving cars don't grow tired and don't have to worry about getting diverted by passengers or phone messages. A computer is also unlikely to be involved in a collision as a result of road rage. According to a National Highway Traffic Safety Administration data from 2015, human error is to blame for 94% of all traffic accidents: Self-driving cars should make the roads considerably safer for everyone because they remove people from the equation. (Gringer, 2018).

History Of Self-Driving Car

Autonomous automobiles are those that are driven by without any human involvement, computer technologies. They are able to navigate and drive themselves on the roadways by detecting the effects on the environment. Their appearance is made to take up less space on the road to prevent traffic jams and lower the possibility of accidents. (Szikora & Madarasz, 2017).

In the 1920s, prototypes of the first autonomous cars were made, although they didn't resemble them today. (Szikora & Madarasz, 2017). Although the "driver" was supposedly absent, these vehicles heavily relied on particular outside inputs. Norman Bel Geddes developed the first self-driving car in GM's 1939 display. It was an electric vehicle that was propelled by electromagnetic fields formed by magnetized metal spikes buried in the road and controlled by radio. General Motors has brought this idea to life by 1958. Pick-up coils, sensors that could sense the current flowing via a wire buried in the

road, were incorporated into the car's front end. The steering wheel of the car could be moved left or right by manipulating the current (Gringer, 2018).

The Japanese expanded on this concept in 1977 by utilizing a camera system that transmitted data to a computer so it could process pictures of the road. However, this car could only go at speeds of less than 20 mph. A decade later, the Germans made improvements with the VaMoRs, a camera-equipped car that could safely drive itself at 56 mph. The capability of self-driving cars to notice and respond to their surroundings has evolved along with technology (Gringer, 2018).

Despite the significant progress, the legally permitted automated vehicles on public roads in 2017 are not totally autonomous; each one requires a human driver to detect when it is required to regain control of the vehicle. (Szikora & Madarasz, 2017).

How Do Self- Driving Car Work

The software that autonomous cars use to operate is executed by sensors, actuators, sophisticated algorithms, machine learning systems, and robust processors. Based on a range of sensors placed in various places of the automobile, autonomous vehicles build and update a map of their environment. Radar sensors keep track of where neighboring vehicles are. Traffic light detection, road sign reading, vehicle tracking, and pedestrian detection are all performed by video cameras. Lidar (light detection and ranging) sensors use the reflection of light pulses from the environment around the automobile to calculate distances, find road boundaries, and recognize lane markers. When parking, the wheels' ultrasonic sensors pick up on curbs and other cars.

After processing all of this sensory data, sophisticated software designs a course and issues commands to the actuators in the automobile, which manage steering, braking, and acceleration. Predictive modelling, object identification, hard-coded rules, and obstacle avoidance algorithms aid the software in adhering to traffic regulations and avoiding obstructions.

The car's artificial intelligence software is integrated with all the sensors and receives data from Google Street View and cameras. The AI manages driving systems including steering and braking by simulating human perception and decision-making processes (Ondruš, et al., 2020). In order to be aware of things like landmarks, traffic signs, and lights in advance, the car's software consults Google Maps. There is an override feature that enables a person to take over driving the car. Information from nearby vehicles, particularly information about traffic congestion and safety hazards, may be useful to individual automobiles. Vehicles and roadside equipment serve as the communicative nodes in a peer-to-peer network in vehicular communication systems, passing information back and forth. (Ondruš, et al., 2020).

Usage Or Implementation Of The Application

Software of Artificial Intelligence (AI) is useful in the creation of self-driving car systems. (Lutkevich, 2019). It stimulates human intelligence which is processed by machines, especially computer systems. In order to create systems that can drive autonomously, developers of self-driving car combine massive amounts of data from image recognition systems with machine learning and neural networks. Machine Learning (ML) which is a type of artificial intelligence (AI) that allows software applications to predict more accurate outcomes without being specifically programmed to do so. Neural network is referred to a technique in AI that instructs computer to analyze data that inspired by human brain. It is type of machine learning process also known as deep learning algorithms. (Tyagi, 2020).

AI, machine learning, deep learning and neural technologies become widely used in autonomous car industry nowadays. With the presence of smartphone app and driverless car, people can direct use voice command to choose location. The car will navigate itself using GPS, camera, and multiple sensors technology involved which are radar and LiDAR. This helps them in path planning and a better understanding of their surroundings. (Bin Sulaiman, 2018).

Next, analysis data from machine vision cameras and sensors able to self-driving or autopilot. AI simulates human perceptual, decision-making processes and managing driving system including steering and breaking based on the ADAS. Firstly, LiDAR or (Light Detection and Ranging) sensors that enables AI system to operate quickly in response to changing evolving road conditions. The accuracy of LiDAR provides is its most important device in autonomous vehicles. It creates a 360 degree of the environment and location in 3D image by using laser, ultraviolet, visible or infrared light. It measures the distance between autonomous vehicle and nearby objects including people, tree, vehicles, roadblock and others. To add, it uses to scan mirror, multiple laser beams and other object space. It also used to estimate a storm and the rate of rainfall, for example, the systems can measure the raindrops in the atmosphere. (Ondruš, et all., 2020).

Furthermore, RADAR or Radio Detection and Ranging where it has similar function as LiDAR, and usually installed on the front and rear bumper of the car. (Gremillion, 2021). The difference its only it using electro-magnetic waves instead of laser. So, it can determine the mutual velocity of the object and the vehicle. (Ondruš, et all., 2020). Besides, the results of Lidar system and radar's detection of the environment are combined by central computer. For instance, oncoming vehicles, speeds, blind spot detection, lane change assistance and other are all will be detected by the radar system.

In addition, Global Positioning System, (GPS) is technology that combines real-time geographic information from satellites including latitude, speed to help navigate and assist in driving. This software components used to record the road signs and directions from the location. It serves the basis for all

maps that vehicle uses while on the road. Besides, this system able maintains the car on its pathway with 30 centimeters accuracy. (Ondruš, et all., 2020). Then, the data detect by the sensors and camera is imported into the central computer. With the rise of camera also help to safety driver such as receive alert from the road maintenance.

In order to sense the environment around the car and then alert the driver or take action, AI processing algorithms requires ADAS (Advance Driver Assistance System) as combination in the sensor's technology of automobile. (Nazir, 2022). A car accident can be prevented by sending out warnings to other drivers or even by taking autonomous action. Thus, with the addition of multiple technology sensors may useful in AI system for existence of autonomous car.

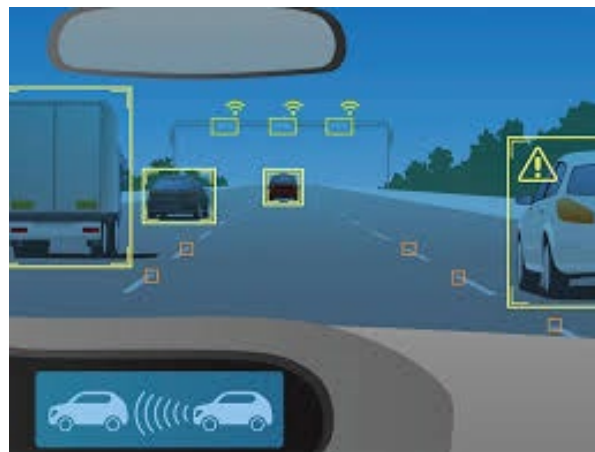


Figure 1: The View of Camera of The Alert Sign by Sensors.

Advantages Of Self-Driving Car

Self-driving car may almost be implemented globally and potentially outdo the classic and antique fuel-powered car due to its pioneer brand like Tesla has already spread its wing to its commercial and marketing. The development of self-driving cars or autonomous vehicles has developed at an unforeseen pace. There are bound to be many advantages that can be beneficial as the technology always seem to seek convenience in human lives.

One of the advantages that can be clearly seen is the reduce of car accident or car crashes. With the help of AI that can fully assist driver and reduce the human strain involved during driving, Self-driving car can ultimately reduce crashes occurred per year. According to government statistics, drivers' actions or mistakes cause 94 percent of collisions; self-driving cars can assist lower driver error (Coalition for Future Mobility, 2017). The artificial intelligences in self-driving car would help driver have more comfortable and safe driving especially in the long duration of driving. As the self-driving

car has an AI and full 360-degree sensor that works co-efficiently and possess a 360° field of view, which is twice as wide as that of humans, where horizontal field of view is only 180°. (Tenorio, 2021).

Accidents will be much decreased thanks to 360-degree vision and vehicles being connected to and in constant communication with one another. Accidents won't be completely eliminated at first, but they will still be significantly fewer than those brought on by human driving. A Google-trained autonomous vehicle crashed in the Mountain View region. The car, however, had been on the road for over 1.4 million kilometres before to the accident without any accidents. Most humans are unable to say the same. (International, 2021)

Other advantages of implementing self-driving car, is not having any waste resource or energy and have a more efficient travel toward desired destination. A more efficient style of travelling as the AI will assist the driver to analyze the best route of travel, estimate the appropriate speed according to the travel time , and safe distance between the car especially during congested traffic. Although their speed is predicted to be slower in large cities, their traffic efficiency will be higher. The AI self-driving car Maintain a secure and constant spacing between vehicles to assist lessen the number of stop-and-go traffic jams.

Real-time communication would enable cars to move efficiently at predetermined distances from one another allowing all passengers in a fully automated car safely engage in more useful or enjoyable tasks like checking email or watching a movie. This self-driving function may be crucial for businessman or corporate worker that need to be in meeting in a moment notice, enabling them to attend the meeting without problem.

Self-driving cars provide a secure and dependable means of transportation for persons who are unable or prefer not to drive especially Blind people, for example, can be self-sufficient, and a self-driving technology could enable them to live the life they desire. It could also provide access for the elderly and the disabled as they are unable or have problem in driving the normal vehicle. Even those with vision or hearing impairments will be able to increase their independence toward other people because the car will be autonomous and operate with little to no human interaction.

Disadvantages Of Self-Driving Car

As human commit more toward self-driving technology and its future prospect, human tend to overlook the disadvantages that comes along with the self-driving technology. The classic fuel powered car may seem frivolous compare the self-driving technology but the technology itself poses some major disadvantages that may be crucial and have yet to have a proper and everlasting solution.

An obvious and significant disadvantage that the self-driving technology possess is the world-wide implementation, and it's not just talking about the self-driving technology having exist in some major country, but having the whole world sees self-driving technology as common like the nowadays fuel powered car. The constraint of having half self-driving vehicle and normal vehicle will affect the self-driving vehicle as they would need to have a wider range of analyzing and require more time to decide thus affecting the vehicle in real time driving. The constraint of having half self-driving vehicle and normal vehicle will affect the self-driving vehicle as they would need to have a wider range of analyzing and require more time to decide thus affecting the vehicle in real time driving. There is a significant difference between a few driverless automobiles on the road and an entire highway filled with them.

Moreover, the infrastructure for autonomous vehicles depends on 5G network coverage, which is still expensive. As a result, it might take governments a long time to invest in enough infrastructure to support autonomous vehicles at their best. While long-term societal cost savings from self-driving cars may be substantial, the initial cost of automated vehicles may be extremely high. The price ought to decrease as new technology develops. However, the initial entry hurdle can be too great for the average person. Thus, proving that the initial implementation of self-driving technology has much constraint and limitation.

Another major disadvantage of the self-driving technology is massive job losses especially those in the transportation or service sector. The human drivers who currently work as taxi and bus drivers will lose their jobs as they may completely rely on AI to operate the vehicles. With the advent of self-driving automobiles, those whose livelihood depends on driving may find their profession obsolete. Bus and taxi drivers, as well as those who work in the trucking industry, will all need to look for new jobs. Additionally, driverless automobiles would displace Uber and fast-food delivery drivers. For those who are not in those sectors may seem like it's not that big of a deal as they have not experienced it firsthand, but the future of the self-driving technology has many potential future prospects and in future the self-driving technology may be implement fully in other sector such as agriculture, flight service and may even be in the food and beverage industry. There may have already been some self-driving technology being implement already or in research and development stages but once the technology can be easily accessing the change will soon arrive.

Last but not least, the self-driving technology possess the ability of being hacked. Being constantly connected to the outside world can cause a cyber concern with data protection. Even the proper management of road networks may be harmed. A car that has been hacked could become exceedingly risky. The risk of a hacker taking over the vehicle and overriding controls exists even while someone is inside the car keeping an eye on things.

On the website HackerNoon, it is discussed how cybercriminals might remotely target a self-driving automobile and the cybersecurity threats it poses. There are deliberate attacks that target the safety-critical AI system functionalities in particular. Examples include painting the road to confuse the GPS or covering stop signs with stickers to obscure their visibility. Such changes may cause the AI algorithms to classify objects incorrectly, which could cause the self-driving car to act in a hazardous manner. (Harris, 2022). To have automated cars talk and coordinate with each other, they would have to use the identical network protocol, therefore it is crucial for the self-driving technology to have a hack proof technology to counter the hacking possibility.

Additional Content

Example Of Autonomous Cars

Tesla

Tesla is one of popular American multination automotive electric vehicle that invented by Elon Musk. This company is built on artificial intelligence technology and they train their algorithms for autonomous car. The latest AI systems that developed in cars are based on unsupervised machine learning. This one of the factors contributing to their success of making their cars fully autonomous. (Marr, 2021). There are several AI features in Tesla which are autopilot and AI integrated chips. Firstly, autopilot is developed using neural network which a part of Artificial Intelligence method. It detects the area around the car using radar, cameras and ultrasonic sensors. Driving is made safer and less stressful by presence of the sensors and cameras. This is because, drivers alert with their surroundings with the help of all the systems. Therefore, cars can autonomously steer, brake or accelerate in the lane because of autopilot.

Second, autonomy algorithm one of AI features that used in Tesla. Before train the neural network to predict such perfect performance, this company combining or gathering all data from the car's sensors across space and time. So, an algorithm can provide precise and large scale of information. The information interprets from images of the sensors that help users to plan their next moves and then make decision what to do. For instance, when the car should switch lanes or stay in the lanes. Therefore, Tesla has to gather data to train the algorithms and keep improved their AI system. (*AI | Tesla*, 2023).

Waymo

Waymo is one of the Google Self-Driving car projects which performed by American company, Google's firm. Waymo Driver using sensors and software to operate the safety rides. They are including three types of sensors which are Lidar, cameras and radar. The most powerful and important sensors that creates 3D image of its surrounding is Lidar. This sensor enabling driver to estimate the distance

and size of objects 360 degrees around it and more than 300 meters away. Moreover, camera act as vision system to capture sharper and detail image when facing challenging environments.

Meanwhile, radar complements both lidar and cameras with ability to estimate speed of object and direction. This very useful in challenging weather such as fog, rain and snow. The popular modal that uses fully autonomous cars is Jaguar I-PACE. Therefore, with the help of AI and machine learning, Waymo Driver uses all information to determine safe route and enable to respond in any traffic condition. The ability to record driving data which is used enhance its performance over time. (Lutkevich, 2019).

Challenges In Autonomous Cars

Weather and Traffic Conditions

Firstly, challenges in lidar and radar of the autonomous cars to sensing the environment conditions. Such as during bad weather, unexpected encounters and traffic conditions. The laser light emitted from the lidar system can be interrupted by snow, fog and heavy rain. The lenses become low visibility and the vision system of the car difficult to identify image such as road signs and marking. Moreover, challenge in the tunnel will disturb the sensors and cameras because of lighting. Because the lighting inside and outside of tunnels is very contrast, the self-driving car face particular difficulties when navigating. In addition, GPS has limits regarding position accuracy and requires a clear view to be effective. Moreover, challenge in the tunnel of the road with interface of GPS such as constructing project that cause complex decision by the system. (Newton, 2022).

Localization

Secondly, automotive industry face challenging in localization because companies need to customized according to the customers experience. Company must take into various linguistic, demographic factors and others while designed the artificial intelligence for automotive applications. For instance, there are design and develop things such as style guides and voice personas by collaboration with linguist partner. This good idea to optimize across many languages. Thus, every automotive company keep analysis and improved AI software for different languages, cultures and country. (*Five Challenges of Artificial Intelligence for Automotive Applications*, 2020).

Security Concern

In addition, automotive industry that works with technology, sensitive information and important software definitely requires proper security. This one of challenges in cybersecurity to ensure the data handled correctly. So, they need additional security for save all the important data of the company. for instance, company face challenges to protect the self-driving cars by machine learning. Most companies look for data partners who provide solutions including secure data access, private cloud deployment

and others. (Causevic, 2017). When developing extensive AI project, the high security standard is crucial in this industry. Therefore, they need competition with other company in order to meet partners who want provide this type of security.

Self-Driving Technology Research in Malaysia

Malaysia aims to lead international development in engineering, manufacturing, and technology. In order to achieve this, the National Automotive Policy 2020 (NAP 2020) aims to grow Malaysia's automotive sector through research and development of new technologies, especially in the fields of Next-Generation Vehicles (NxGV), Industrial Revolution 4.0 (IR 4.0), and Mobility-as-a-Service (MaaS). (Amirul, 2021). Since 2019, the autonomous vehicle test bed (AVTB) has been conducting tests to see how well different technologies work with the local environment and infrastructure while analysing autonomous vehicles and creating NxGV parts and components. The Cyberjaya MyAV Testing Route is a forward-thinking initiative to support the AVTB in a bigger way, possibly increasing local technical innovation in the NxGV space. (Jerrica, 2020).

In September 2016, a level 3 automated self-driving Proton Perdana was developed by REKA, a Malaysian R&D tech company. As part of the 5G Malaysia demonstration in April 2020, Celcom displayed a self-driving Proton Exora using the autonomous system created by MooVita and Ericsson, accelerating the development of autonomous car technology. (Gill, 2019).

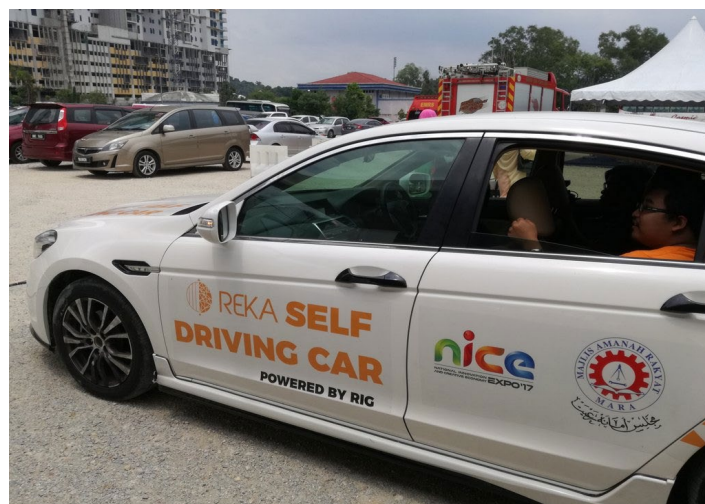


Figure 2: The Self-Driving Prototype of The Proton Perdana



Figure 3: The Self -Driving Prototype of The Proton Exora

A local startup, Kommu aims to achieve an autonomous self-driving technology, the startup turns existing car into a level 2 of the 6 level of automation driving by the Society of Automotive Engineers (SAE). (Dayangku, 2022). Although, Kommu being a level 2 advanced driver assistance system, it still requires driver attention. The product, KommuAssist include feature such as auto lane centering, auto gas and brake, auto lane change with the ability to integrate with a vehicle's blind spot monitoring function, active safety features like a pre-collision warning, lane departure warning, and auto emergency braking.



Figure 4: The Advance Driver Assistance System (ADAS) Of the Kommuassist



Figure 5: The Product of The Kommu Company

Conclusion

In conclusion, semi- and fully autonomous vehicle technology is highly developed and ready for commercial deployment. Street mapping, accident avoidance, and navigation have all advanced significantly thanks to major automobile manufacturers and software providers (West, 2016). Governments' regulatory practices have the power to either hasten or hinder the transition to autonomous vehicles. All nations considering autonomous vehicles should place a high priority on addressing pertinent issues and ensuring that regulatory guidelines are clear.

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PERBANDINGAN KAEDAH PDP BAGI SUBJEK STATISTIK

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ABSTRACT

Pengajaran dan pembelajaran (pdp) bagi subjek statistik bagi pelajar kejuruteraan pada semester terkini (Okt 2022 – Feb 2023) dijalankan secara kaedah bercampur ataupun lebih dikenali sebagai 'blended learning (BL)' iaitu kombinasi di antara pembelajaran dalam talian dan juga bersemuka. Pelajar yang mengambil subjek statistik bagi peringkat ijazah menjalankan kelas secara bersemuka selama dua jam sahaja (syarahan 1 jam, tutorial 1 jam) dan 2 jam yang seterusnya (syarahan 2 jam) adalah secara dalam talian. Pelajar perlu membiasakan diri dengan kaedah BL memandangkan kaedah pembelajaran pada lima semester berturut-turut sebelum ini adalah secara dalam talian sepenuhnya. Pada semester terkini, kesemua penilaian iaitu ujian, tugas dan peperiksaan akhir akan dijalankan secara fizikal, berbeza dengan penilaian bagi lima semester berturut-turut sebelum ini berasaskan 'open-book' yang dijalankan secara dalam talian. Soal selidik peringkat awal dilakukan kepada 54 orang pelajar bagi mengetahui maklumbalas terhadap pandangan pelajar dalam kaedah pembelajaran subjek statistik. Data markah sebanyak 104 orang pelajar juga diambil bagi dua semester terkini dan seterusnya ujian-t bagi sampel tak bersandar digunakan untuk menganalisa data. Berdasarkan tinjauan awal dari soal selidik, didapati majoriti pelajar memilih pembelajaran secara BL iaitu gabungan di antara pembelajaran dalam talian dan bersemuka. Namun begitu, jika dibandingkan markah penilaian bagi dua semester terkini didapati pencapaian pembelajaran dalam talian sepenuhnya adalah lebih baik dari pencapaian semasa 'blended learning (BL)'.

Kata Kunci: *BL, pdp, pembelajaran dalam talian, bersemuka, penilaian*

Pengenalan

Kaedah penyampaian pembelajaran yang baik merupakan suatu elemen yang penting dalam proses pdp untuk memastikan para pelajar dapat mencapai objektif-objektif pembelajaran. Di antara kaedah penyampaian pembelajaran yang telah diterapkan ialah ODL (*Open & Distance Learning*), BL (*Blended Learning*) dan HL (*Hybrid Learning*). ODL merujuk kepada pembelajaran yang fleksibel dalam kaedah penyampaian sama ada secara dalam talian ataupun bersemuka. BL merupakan kursus yang mempunyai campuran pembelajaran mod dalam talian dan juga mod pembelajaran bersemuka. Pembelajaran hibrid pula menekankan pembelajaran dalam talian dan bersemuka dalam masa serentak.

Berdasarkan Amos, Ekemini dan Ifiok (2012), kajian mendedahkan bahawa menggunakan pembelajaran campuran dapat meningkatkan hasil pembelajaran pelajar dalam pra-algebra. Menurut Sari dan Priatna (2020) pula, BL sesuai digunakan dalam pembelajaran matematik di mana bahan

pengajaran boleh didapati dengan mudah sekiranya secara dalam talian. Bahan pengajaran yang digunakan adalah video, animasi, simulasi, imej dan audio.

Munirah, Faisal, Syaheeda dan Julia (2021) mendapati bahawa pembelajaran dalam talian adalah kurang efektif berbanding dengan pembelajaran secara bersemuka. Namun, berbeza dengan kajian Jean, William dan Scot (2011) menemui dapatan bahawa pencapaian akademik adalah dalam prestasi yang baik bagi subjek matematik semasa pembelajaran dalam talian.

Berdasarkan kajian Muntajeeb (2011) pula, pencapaian akademik di kalangan pelajar yang mengikuti pembelajaran secara bersemuka didapati agak rendah kerana pembelajaran hanya terhad di dalam kelas sahaja. Manakala pencapaian akademik secara dalam talian adalah pada kadar yang agak tinggi kerana adanya perkongsian maklumat di dalam talian yang lebih kreatif.

Briliannur, Aisyah, Uswatun, Abdy dan Hidayatur (2020) mendapati bahawa pembelajaran secara dalam talian bagi pelajar sekolah adalah kurang berkesan kerana wujudnya kekangan ekonomi dari segi sarana dan prasarana. Kajian ini juga turut mendapati para pelajar tidak bersedia dari segi teknologi. Ini mungkin disebabkan situasi pembelajaran pelajar sekolah adalah berbeza dengan pelajar peringkat tinggi di universiti, kolej dan sebagainya.

Dalam kajian ini, pengkaji mendapati bahawa prestasi pembelajaran bagi kaedah pengajaran dalam talian sepenuhnya adalah lebih baik jika dibandingkan dengan kaedah BL. Dapatan ini mempunyai persamaan dengan Jean et. al (2011). Namun, kajian lanjut perlu diteruskan memandangkan dapatan kajian ini hanya melibatkan beberapa semester sahaja.

Metodologi

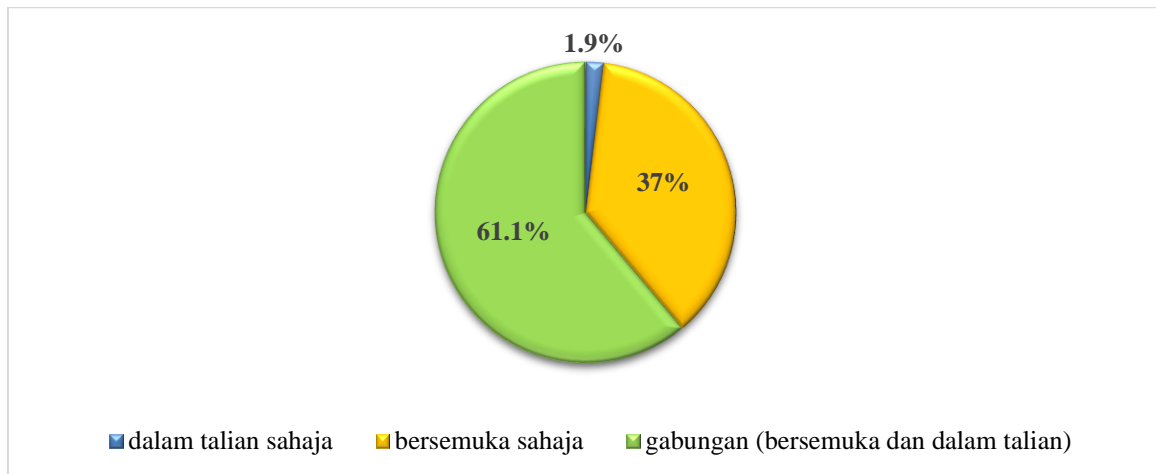
Kajian ini melibatkan seramai 54 orang pelajar (Okt 2022 – Feb 2023) bagi tujuan soal selidik berkaitan kaedah penyampaian pembelajaran statistik. Soal selidik ini dilakukan kepada para pelajar yang menjalankan pembelajaran secara BL bagi semester terkini setelah menjalankan pembelajaran dalam talian sepenuhnya selama lima semester berturut-turut sebelum ini.

Data markah penilaian juga digunakan bagi dua semester iaitu Mac 2022 – Ogos 2022 (Kumpulan 1) dan Okt 2022 – Feb 2023 (Kumpulan 2). Data ini melibatkan seramai 108 orang pelajar. Selain menggunakan deskriptif data statistik, kajian ini juga menggunakan ujian-t sampel tak bersandar untuk menguji perbezaan min bagi dua jenis pembelajaran yang berbeza iaitu secara dalam talian sahaja dan secara BL.

Analisa dan Perbincangan

Hasil dari analisa soal selidik menunjukkan bahawa pelajar lebih menyukai kaedah BL bagi subjek statistik iaitu sebanyak 61.1%. Manakala sebanyak 37% pelajar memilih untuk menjalankan

pembelajaran secara bersemuka. Bagi pembelajaran dalam talian, hanya 1.9% pelajar sahaja yang bersetuju. Rajah 1 berikut menunjukkan peratusan kaedah penyampaian pembelajaran pilihan pelajar.

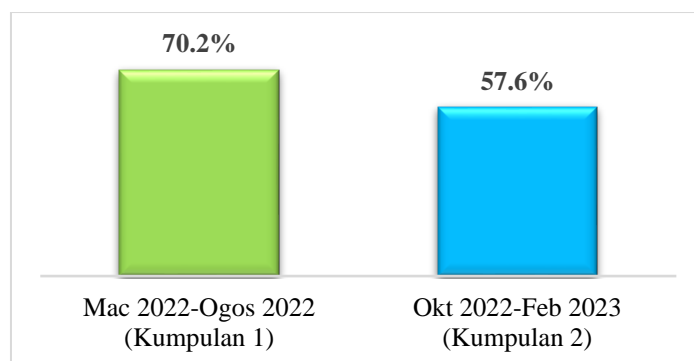


Rajah 1: Peratusan pilihan pembelajaran

Berdasarkan soal selidik, terdapat beberapa masalah yang disenaraikan oleh pelajar-pelajar semasa menjalankan pembelajaran pada semester terkini. Di antaranya ialah:

1. “Apabila kelas online, saya kerap hilang fokus.”
2. “Malu untuk bertanya jika dalam talian.”
3. “Masa yg terlalu singkat. Mungkin kelas 2 jam syarahan dilakukan secara bersemuka dan kelas 1 jam syarahan lagi atas talian.”
4. “Dalam talian banyak kali terlepas apa yang pensyarah ingi sampaikan atas masalah internet.”
5. “Saya lebih suka bersemuka, kerana jika bersemuka saya lagi mudah untuk fokus.”
6. “Tidak fokus pada kelas online tapi lebih fokus pada kelas bersemuka”
7. “Sukar membiasakan diri untuk belajar tanpa ‘open book’.”

Analisa diteruskan dengan menganalisa keputusan min markah. Berdasarkan Rajah 2, didapati min markah bagi Kumpulan 1 (dalam talian) adalah lebih tinggi iaitu sebanyak 70.2% jika dibandingkan dengan semester terkini iaitu sebanyak 57.6% bagi kumpulan 2 (BL).



Rajah 2: Min markah mengikut semester

Bagi mengesahkan min markah adalah berbeza secara signifikan, ujian hipotesis dua sampel tak bersandar diuji dengan menggunakan ujian-t. Ujian hipotesis tersebut ialah:

$H_0: \mu_1 = \mu_2$ (Markah adalah sama bagi kedua-dua semester)

$H_1: \mu_1 \neq \mu_2$ (Terdapat perbezaan markah bagi kedua-dua semester)

Berdasarkan nilai-p yang diperolehi dari ujian-t, didapati nilai-p = .000 ($< \alpha = .005$). H_0 akan ditolak sekiranya nilai-p kurang daripada nilai alpha = 0.05. Dengan ini, dapat diringkaskan bahawa secara statistiknya bahawa terdapat perbezaan yang signifikan di antara dua kumpulan min markah semester yang dikaji iaitu Okt 2022 – Feb 2023 dan Mac 2022 -Ogos 2022.

Jadual 1: Output SPSS

t-test for Equality of Means						
t	df	Sig.	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
5.170	106	.000	12.667	2.450	7.809	17.524

Jadual 1 di atas menunjukkan keputusan yang diperolehi dari output SPSS, Berdasarkan selang keyakinan (7.809, 17.524), kesemua nilai tersebut adalah lebih besar dari 0 iaitu $\mu_1 - \mu_2 > 0$ di mana ini menunjukkan bahawa min markah bagi kumpulan 1 (Mac 2022 – Ogos 2022: dalam talian) lebih besar daripada min markah bagi kumpulan 2 (Okt 2022 – Feb 2023: BL).

Kesimpulan

Berdasarkan analisa dan perbincangan, dapat disimpulkan bahawa pencapaian markah subjek statistik bagi semester sebelum (Mac 2022 – Ogos 2022: pembelajaran dalam talian sepenuhnya) adalah lebih baik jika dibandingkan dengan semester terkini (Okt 2022 – Feb 2023: BL).

Pembelajaran secara BL pada semester terkini (Okt 2022 – Feb 2023) bagi subjek statistik sedikit sebanyak memberi impak kepada pencapaian markah para pelajar. Walaupun terdapat kelebihan apabila pembelajaran BL diketengahkan, namun begitu terdapat segelintir pelajar yang belum dapat membiasakan diri menjawab peperiksaan tanpa membuka buku. Ini mungkin disebabkan masalah peribadi, teknikal dan lain-lain masalah semasa pembelajaran dalam talian selama 2 jam bagi sesi syarahan. Pembelajaran 2 jam yang seterusnya adalah secara bersemuka bagi sesi syarahan selama 1 jam dan sesi tutorial selama 1 jam. Maklumbalas dari pelajar menyatakan bahawa mereka lebih menyukai pembelajaran secara bersemuka namun masa yang ditetapkan hanyalah 2 jam sahaja di mana ianya terlalu singkat. Kebanyakan pelajar mempunyai masalah kurang fokus dan sukar untuk memahami sesuatu topik dengan lebih mendalam semasa pembelajaran dalam talian.

Sekiranya pembelajaran secara bersemuka diterapkan semula sepenuhnya pada semester-semester mendatang, kemungkinan besar pencapaian pelajar dalam subjek statistik akan meningkat dari masa ke semasa. Para pelajar perlu membiasakan diri dengan pembelajaran secara bersemuka memandangkan kesemua penilaian akan dijalankan secara fizikal dan tanpa ‘open-book’. Antara cadangan kajian lanjutan, pengkaji seterusnya disarankan untuk mengambil data markah bagi beberapa semester mendatang untuk mengetahui analisa lanjutan pencapaian markah bagi subjek statistik.

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KEFAHAMAN MATEMATIK PELAJAR PRA SAINS: ANALISA ASAS ALGEBRA

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ABSTRACT

Asas matematik adalah penting bagi pelajar memahami konsep yang betul dalam matematik. Konsep asas yang betul juga dapat membantu pelajar mempelajari matematik dengan baik di peringkat yang lebih tinggi. Justeru itu, kajian ini dijalankan bagi mengkaji kefahaman pelajar bagi tajuk asas algebra dan juga operasi tambah, tolak, darab dan bahagi. Seramai 76 orang pelajar pra sains telah terlibat dalam kajian ini. Dua belas soalan mudah telah diberi kepada pelajar tersebut dan analisa deskriptif dijalankan berdasarkan markah yang diperolehi. Pelajar tidak dibenarkan menggunakan kalkulator bagi melihat kefahaman pelajar menjawab soalan mudah tersebut. Secara keseluruhannya didapati bahawa majoriti pelajar dapat menjawab soalan tersebut dengan betul terutama bagi soalan yang melibatkan operasi tambah, tolak, darab dan bahagi. Walaubagaimanapun ada sebahagian pelajar yang masih lagi lemah dalam asas matematik terutamanya soalan melibatkan pemboleh ubah dan nombor. Oleh yang demikian, dapat disimpulkan bahawa pelajar dapat menguasai asas matematik yang baik untuk operasi tambah, tolak dan bahagi serta yang melibatkan algebra. Namun demikian, pelajar perlu tingkatkan lagi usaha untuk mengukuhkan lagi konsep asas matematik terutama yang melibatkan algebra.

Keywords: *asas matematik, algebra, deskriptif, konsep asas, kefahaman*

Pengenalan

Algebra merupakan salah satu subjek yang penting dan ianya merupakan topik yang akan dipelajari semasa semester 1 di peringkat diploma bagi kursus-kursus matematik, kejuruteraan dan kursus sains yang lain. Sukatan pelajaran bagi topik algebra juga adalah mudah kerana ianya telah dipelajari sejak di peringkat sekolah menengah. Walaubagaimanapun ianya masih belum dapat dikuasai dengan sebaiknya oleh pelajar. Pelajar juga sering melakukan kesalahan mudah dan tidak dapat memahami kehendak soalan.

Terdapat beberapa kajian telah dijalankan bagi mengenalpasti kesalahan matematik asas bagi topik algebra. Menurut kajian oleh Zahit, R. B. dan Sharip, N. F. B. (2019), pelajar banyak melakukan kecuaiian bagi sebutan yang bertanda negatif dalam menyelesaikan operasi tambah, tolak, darab dan bahagi. Pelajar juga tidak melakukan kaedah pemfaktoran dengan lengkap terhadap faktor sepunya terbesar dan gagal mencari pasangan faktor yang sesuai serta lain-lain kesalahan yang tidak dapat

dikategorikan. Mereka juga menyarankan bahawa pensyarah perlu lebih kreatif dan inovatif dalam proses pembelajaran supaya pelajar lebih meminati matematik.

Dapatan yang sama juga diperolehi daripada kajian Nuri Rahmiaty, Nazariah Nazariah, Muhammad Yani(2021). Mereka mendapati bahawa pelajar banyak melakukan kesalahan konsep asas, tidak memahami soalan dan melakukan kesalahan dalam operasi algebra. Kesalahan yang dilakukan banyak dipengaruhi oleh cara penulisan yang tidak teliti dan kurang memahami asas dalam algebra.

Patmawati, P., Lukman, H. S., dan Setiani, A(2022) juga dalam kajiannya mendapati kesalahan yang sama tetapi yang melibatkan pecahan algebra. Pelajar masih lagi melakukan kesalahan yang melibatkan tanda negatif dan juga masih lagi tidak dapat menulis dan mengaplikasikan formula dengan betul. Antara faktor-faktor penyebab yang dikenalpasti dalam kajian ini ialah tidak memahami soalan, tidak memahami konsep asas pecahan dan juga tidak memahami dalam memanipulasi pecahana algebra.

Kajian oleh Mohd Rizal dan Yin Yeh Ling(2021) pula mendapati bahawa pelajar yang gagal dalam matematik adalah berpunca daripada tahap keyakinan diri yang rendah dan masalah kehidupan peribadi pelajar. Kajian ini juga telah menyenaraikan beberapa strategi yang perlu dilaksanakan oleh pelajar bagi menguasai konsep asas dalam matematik. Antaranya ialah bersedia melakukan perubahan kecil dalam pembelajaran, membina keyakinan diri bersama rakan sebaya dan juga perlu mengambil inisiatif dalam mengenalpasti masalah dan mencari penyelesaiannya. Justeru itu kajian ini juga dilakukan bagi tujuan yang sama iaitu bagi melihat kesalahan yang sering dilakukan oleh pelajar ketika menjawab soalan matematik dan supaya ianya tidak berulang lagi di masa-masa akan datang.

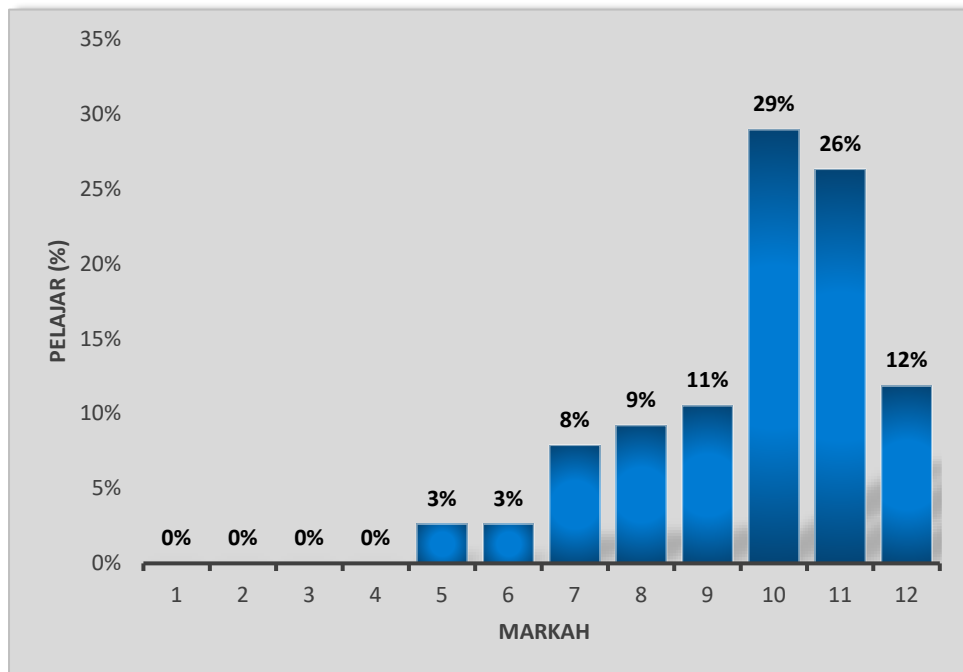
Metodologi

Kajian ini melibatkan seramai 76 orang pelajar Pra Sains, Universiti Teknologi Mara Cawangan Pulau Pinang. Pelajar telah diberi sebanyak 12 soalan mudah berkaitan asas matematik. Lima soalan yang melibatkan operasi tambah, tolak dan bahagi, manakala 7 soalan lagi melibatkan Algebra. Pelajar tidak dibenarkan untuk menggunakan kalkulator bagi menjawab soalan-soalan tersebut. Tujuannya adalah bagi melihat kefahaman pelajar terhadap pengiraan secara manual tanpa bantuan alatan elektronik. Markah untuk keseluruhan soalan adalah 12 markah iaitu hanya 1 markah akan diberikan untuk jawapan yang betul sahaja. Setiap jawapan yang betul kemudiannya dianalisa menggunakan deskriptif statistik. Soalan yang mendapat markah yang terendah akan disemak dan diteliti untuk melihat kesalahan yang kerap kali dilakukan.

Keputusan dan Perbincangan

Secara purata, pelajar mendapat sebanyak 9.74 markah di mana julat markah adalah 5 - 12 markah.

Rajah 1 menunjukkan carta palang bagi peratus pelajar dan markah yang diperolehi.

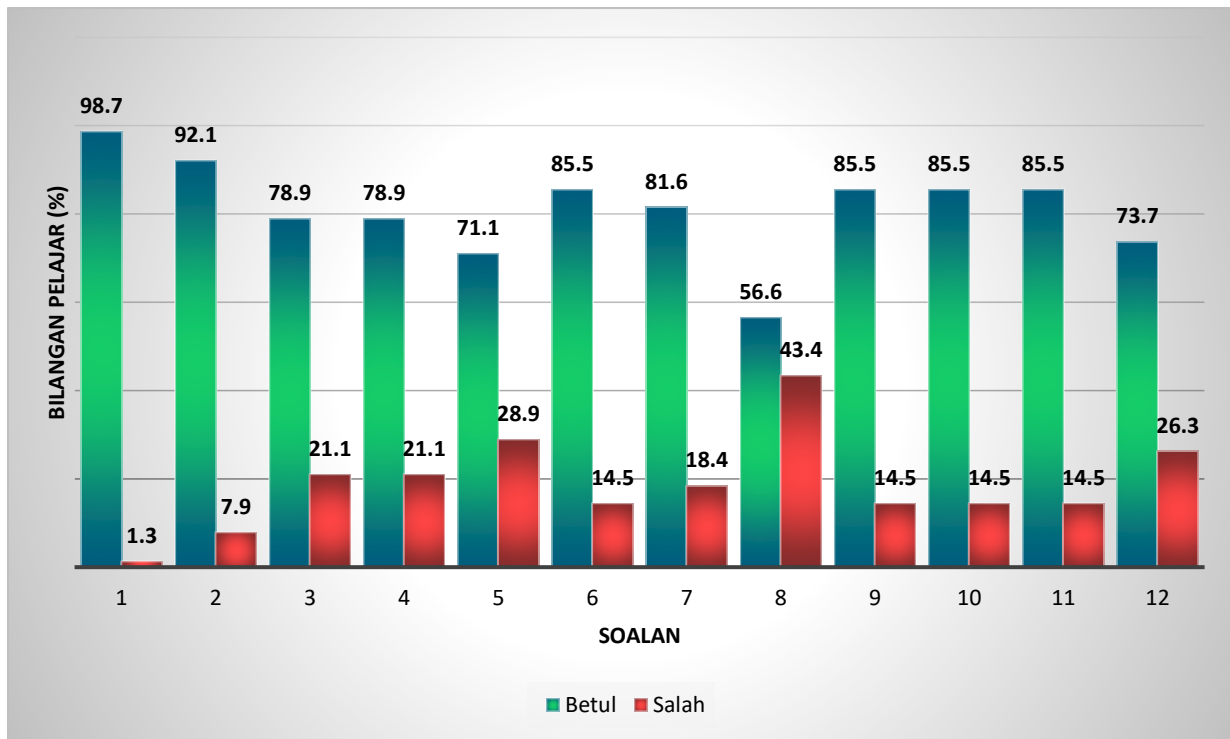


Rajah 1 : Peratus markah pelajar bagi semua soalan.

Berdasarkan Rajah 1, didapati bahawa majoriti pelajar memperolehi markah sebanyak 10 dan 11 markah iaitu masing-masing 29% (22 orang pelajar) dan 26% (20 orang pelajar) manakala hanya 2 pelajar (3%) yang mendapat markah sebanyak 5 dan 6 markah. Didapati juga tiada pelajar yang mendapat 0 sehingga 4 markah. Ini menunjukkan bahawa, pelajar masih boleh menjawab soalan dengan baik tanpa menggunakan alat bantuan elektronik atau kalkulator. Didapati juga bahawa terdapat 12% (9 orang) pelajar yang mendapat markah penuh.

Hasil analisa daripada setiap soalan, peratus bilangan pelajar yang menjawab dengan betul ditunjukkan pada Rajah 2. Didapati bahawa majoriti pelajar dapat menjawab soalan dengan betul terutama bagi soalan 1 dan 2 masing-masing adalah sebanyak 98.7% dan 92.1% iaitu yang melibatkan operasi tambah dan tolak. Tetapi majoriti pelajar telah menjawab dengan salah untuk soalan 8 iaitu sebanyak 43.4%. Soalan ini merupakan soalan algebra yang mengandungi pembolehubah untuk operasi darab dan bahagi. Kesalahan yang agak tinggi ini menunjukkan bahawa, pelajar masih lagi tidak dapat menggunakan atau memahami konsep asas yang melibatkan pembolehubah dan nombor dalam operasi darab dan bahagi. Soalan ini juga memerlukan pelajar memahami atau mengingati formula untuk nombor yang melibatkan eksponen atau nombor index. Walaupun terdapat peratus pelajar yang dapat

menjawab soalan 8 dengan agak rendah (56.6%), pelajar masih dianggap dapat menjawab dengan baik secara keseluruhannya.



Rajah 2: Peratus markah pelajar bagi setiap soalan

Kesimpulan

Penguasaan asas matematik amat diperlukan bagi pelajar-pelajar yang akan melanjutkan pelajaran ke peringkat yang lebih tinggi. Pelajar perlu mula menguasainya daripada sekarang supaya mereka dapat memenuhi keperluan universiti untuk silibus yang lebih penting. Jadi daripada dapatan kajian, pelajar-pelajar dapat menguasai dengan baik terutama penyelesaian yang melibatkan operasi tambah, tolak, bahagi dan darab. Masih terdapat juga segelintir pelajar ini yang tidak dapat menguasai matematik algebra terutama penyelesaian yang melibatkan pembolehubah dan nombor. Selain itu, melalui kajian ini juga, kesalahan yang sering lakukan oleh pelajar dalam topik ini dapat dikenal pasti. Secara tidak langsung, pendedahan tentang kesilapan pelajar juga dapat diatasi semasa proses pengajaran dan pembelajaran. Walaubagaimanapun, para pendidik juga memainkan peranan penting dengan menggunakan strategi dan kaedah baru yang berkesan supaya dapat meningkatkan kefahaman pelajar dalam topik asas matematik. Oleh yang demikian, diharap para pendidik dapat memberi penekanan terhadap topik-topik asas yang dianggap sukar oleh pelajar. Pelajar juga perlu ada keyakinan diri dan tingkatkan usaha untuk memahami topik-topik asas yang sukar dengan lebih baik.

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HASIL ITEM TOLAKAN PENGIRAAN ZAKAT PENDAPATAN DARI KUMPULAN FOKUS MUZZAKI M40 UNTUK ZAKAT PULAU PINANG

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ABSTRAK

Zakat pendapatan merupakan salah satu zakat yang perlu dikeluarkan oleh umat Islam yang berkelayakan mengikut kadar pendapatan bersih tahunan. Pendapatan bersih bermaksud pendapatan tahunan yang akan ditolak dengan item tolakan dibenarkan oleh pusat zakat negeri seperti tolakan untuk diri sendiri, tanggungan, penginapan, simpanan (tabung haji dan kwsp) dan lain-lain. Item tolakan ini perlu dikemaskini bagi memastikan ia sentiasa mengikuti perkembangan zaman dan ekonomi semasa. Oleh itu, satu kumpulan fokus muzzaki diwujudkan dari kalangan M40 bagi mengenalpasti item tolakan yang terkini untuk dicadangkan kepada Zakat Pulau Pinang. Kumpulan fokus ini terdiri daripada 4 orang muzzaki yang bekerja di sektor kerajaan, swasta dan usahawan. Sesi kumpulan fokus ini telah diadakan di Hotel Eastern & Oriental, Pulau Pinang pada 4 September 2022. Sesi ini telah berjalan selama 4 jam dan telah dikendalikan oleh 2 orang moderator. Peserta kumpulan fokus telah diberi ruang untuk menyuarakan item yang dirasakan perlu dicadangkan dalam tolakan pengiraan zakat mengikut parameter yang telah disenaraikan seperti makanan, perlindungan, kesihatan, pakaian, pendidikan, pengangkutan, perancangan kewangan, gaya hidup dan lain-lain. Kertas kerja ini menyenaraikan hasil cadangan item tolakan yang terdiri daripada parameter makanan (5 item), perlindungan (27 item), kesihatan (15 item), pakaian (7 item), pendidikan (20 item), pengangkutan (16 item), perancangan kewangan (13 item), gaya hidup (12 item) dan lain-lain (5 item).

Keywords: kumpulan fokus muzzaki, pengiraan zakat pendapatan, zakat pulau pinang

Pengenalan

Terdapat pelbagai zakat di Malaysia termasuklah zakat fitrah, zakat perniagaan, zakat emas dan tidak terkecuali zakat pendapatan (Noor Zahirah et al., 2019). Zakat pendapatan merupakan salah satu zakat yang perlu dikeluarkan oleh umat Islam yang berkelayakkan selepas mengira pendapatan bersih tahunan. Kategori tolakan yang disenaraikan oleh ZPP adalah seperti diri sendiri, pasangan, bilangan

anak, nafkah untuk ibu/bapa, potongan KWSP, caruman Tabung Haji. Kategori tolakan ini terdiri daripada parameter makanan, perlindungan, kesihatan, pakaian, pendidikan, pengangkutan dan perancangan kewangan. Oleh itu, bagi memastikan item tolakan pada setiap parameter adalah relevan dan mengikuti perkembangan semasa, satu sesi fokus kumpulan muzakki dari golongan M40 telah diadakan. M40 merujuk kumpulan berpendapatan sederhana yang pendapatan isi rumah antara RM4,851 sebulan sehingga RM10,970 sebulan (Rebecca Hani, 2021). Sesi ini telah berlangsung di hotel Eastern and Oriental di Pulau Pinang pada 4 September 2022. Hasil item yang dikenalpasti ini, akan dicadangkan kepada Zakat Pulau Pinang untuk diambil kira dalam pengiraan tolakan zakat pendapatan.

Peserta kumpulan fokus muzakki M40 adalah seramai 4 orang iaitu dari sektor kerajaan (1 orang), swasta (2 orang) dan usahawan (1 orang). Peserta ini telah diberi ruang untuk mencadangkan item-item baru yang perlu disenaraikan dalam tolakan dalam sesi ini. Sesi ini telah berlangsung selama 4 jam pada sesi pagi dan dikendalikan oleh 2 orang moderator.

Kajian Kesusasteraan

Item tolakan pengiraan zakat pendapatan adalah panduan digunakan oleh para pembayar zakat dalam mengisi kategori tolakan yang disenaraikan oleh pihak zakat. Pengiraan ini membolehkan tolakan yang dibenarkan releeven kepada para muzakki. Ini termasuklah golongan M40.

Setakat penelitian penyelidik, terdapat beberapa kajian ditemui boleh dilibatkan dalam sorotan kerana berkenaan pengiraan zakat pendapatan bersama dengan muzakki atau pembayar zakat. Antaranya termasuklah kajian yang mengkaji kepatuhan pembayar zakat pendapatan di Universiti Pendidikan Sultan Idris (Fidzlizan et.al, 2016). Para pengkaji mendapati kebanyakan responden menghadapi kesukaran kerana ketidakupayaan mereka untuk menghitung pendapatan sebenar dalam pengiraan zakat pendapatan. Justeru, hasil ini perlu menjadi keperluan kepada pihak berautoriti untuk memberikan maklumat dan penerangan tambahan berkenaan zakat pendapatan untuk memastikan harta individu lebih bersih dan adil.

Seterusnya, kajian oleh Norazlin et. Al (2019) berkenaan pelaksanaan skim kafalah muzakki di PPZ, Majlis Agama Islam Wilayah Persekutuan. Skim kafalah muzakki merupakan intensif skim perlindungan kepada pembayar zakat PPZ, MAIWP. Kajian ini mengkaji berkenaan mekanisme pelaksanaan skim kafalah muzakki dan menganalisis kes-kes yang berlaku kepada pembayar zakat. Terdapat beberapa prosuder pelaksanaan dan syarat kelayakan pembayar cukai diperlukan untuk waris menuntut intensif skim kafalah. Ini termasuklah permohonan adalah waris terdekat iaitu pasangan si mati, anak, ibu dan bapa serta pihak ketiga yang berdaftar. Tuntutan juga hendaklah dilakukan dalam tempoh 6 bulan dari tarikh kematian.

Selain itu, kajian Ruziah dan Patmawati (2022) telah memfokuskan faktor-faktor peningkatan dan kutipan pembayar zakat ketika pandemik covid 19. Antara faktor-faktor yang berlakunya peningkatan dan kutipan termasuklah niat pembayar zakat itu sendiri di samping pengetahuan mengenai zakat. Pembayar zakat juga mempunyai motivasi yang tinggi dalam usaha untuk membayar zakat kerana ianya adalah kewajipan. Kajian Syadiyah (2021) mendapati sebab seseorang itu membayar zakat adalah kerana mengetahui kewajibannya sebagai umat Islam, melibatkan keberkatan rezeki di samping wujud dorongan dan galakan persekitaran sekeliling serta kemudahan dalam pembayaran melalui pelbagai platform.

Metodologi

Teknik kumpulan fokus telah dipilih sebagai kaedah kutipan data. Peserta yang menyertai kumpulan fokus ini adalah seramai 4 orang, berlatar belakang seperti didalam jadual 1.

Jadual 1: Latar Belakang Peserta Kumpulan Fokus

Peserta	Umur	Pendidikan	Pekerjaan	Jantina
1	38	Ijazah Sarjana Muda	Jurutera	Perempuan
2	35	Diploma	Juruteknik	Lelaki
3	46	Ijazah Sarjana Muda	Usahawan	Lelaki
4	41	Ijazah Sarjana Muda	Kerajaan	Lelaki

Sesi ini telah diadakan di hotel Eastern and Oriental Pulau Pinang, bertarikh 4 September 2022. Masa sesi adalah selama 4 jam bermula pada pukul 8.30 pagi hingga 12.30 tengahari. Sesi ini dikendalikan oleh 2 orang moderator yang bertugas sebagai bertanyakan soalan dan pencatat jawapan. Soalan yang diutarakan adalah meliputi kepada parameter yang telah dikenalpasti iaitu makanan, perlindungan, kesihatan, pakaian, pendidikan, pengangkutan, perancangan kewangan, gaya hidup dan lain-lain.

Hasil Kajian

Berikut adalah hasil kajian mengikut parameter makanan (jadual 2), perlindungan (jadual 3), kesihatan (jadual 3), pakaian (jadual 4), Pendidikan (jadual 5), pengangkutan (jadual 6), perancangan kewangan (jadual 7), gaya hidup (jadual 8) dan lain-lain (jadual 9).

Jadual 2: Hasil Cadangan Item Parameter Makanan

Bilangan	Item
1	Belanja dapur untuk memasak di rumah
2	Belanja makan di luar
3	Belanja makanan khas untuk kanak-kanak/bayi
4	Belanja lain-lain contoh (makanan ringan)
5	Makanan Binatang Peliharaan

Jadual 3: Hasil Cadangan Item Parameter Perlindungan

Bilangan	Item
1	Bayaran pinjaman perumahan
2	Sewa rumah
3	Bil air
4	Bil elektrik
5	Bil pembentungan (IWK)
6	Penyelenggaraan bangunan rumah
7	Pembaikan dan penyelenggaraan dalam rumah
8	Cukai pintu
9	Cukai tanah
10	Bil telefon (rumah)
11	Bil internet (rumah)
12	Bil telefon bimbit
13	Insuran kebakaran rumah
14	Sabun pencuci pakaian/pinggan/rumah
15	Ubat nyamuk/serangga perosak
16	Kelengkapan rumah (cth: perabot, katil)
17	Penapis air
18	Penapis udara
19	Yuran persatuan taman
20	Langgan aplikasi pengstreaman
21	Mesin rumput
22	Perkhidmatan cuci rumah
23	Wang dobi & pengering
24	Hotel binatang peliharaan
25	Penyelenggaraan landskap
26	Pembantu rumah
27	Pengasuh anak

Jadual 4: Hasil Cadangan Item Parameter Kesihatan

Bilangan	Item
1	Takaful kesihatan/perubatan/kemalangan
2	Insuran kesihatan/perubatan/kemalangan
3	Keperluan khas pengidap penyakit kronik
4	Rawatan perubatan (klinik/hospital)
5	Saringan kesihatan (<i>medical check-up</i>)
6	Belanja ubat-ubatan penyakit ringan (tanpa jumpa doktor)
7	Belanja sewa gelanggang permainan sukan
8	Belanja makanan tambahan/vitamin/ <i>supplement</i>
9	Belanja kanta lekap/cermin mata
10	Belanja gunting rambut
11	Belanja spa/urutan muka
12	Belanja penjagaan ibu bersalin
13	Belanja penjagaan diri (cth: minyak rambut, minyak wangi, syampoo, bedak, alat solek, ubat gigi, berus gigi, etc.)
14	Rawatan khas dan penjagaan ibubapa
15	Penjagaan ibubapa

Jadual 5: Hasil Cadangan Item Parameter Pakaian

Bilangan	Item
1	Pakaian lelaki dewasa
2	Pakaian wanita dewasa
3	Pakaian remaja lelaki
4	Pakaian remaja wanita
5	Pakaian kanak-kanak lelaki
6	Pakaian kanak-kanak wanita
7	Pakaian bayi

Jadual 6: Hasil Cadangan Item Parameter Pendidikan

Bilangan	Item
1	Pakaian seragam anak IPT
2	Pakaian seragam anak sekolah menengah
3	Pakaian seragam anak sekolah rendah
4	Pakaian seragam KAFA
5	Pakaian sukan
6	Yuran pengajian/pendidikan
7	Tambang bas sekolah/kos kenderaan ke pusat pengajian
8	Yuran ko-kurikulum
9	Lawatan sambil belajar
10	Yuran PIBG
11	Belanja beli buku
12	Yuran tuisyen
13	Yuran latihan kemahiran (cth: sukan, alat muzik, pertukangan, etc.)
14	Belanja beli majalah/surat khabar
15	Komputer riba
16	Telefon Bimbit
17	Internet
18	Yuran Transit Anak
19	Pencetak
20	Pendidikan Khas

Jadual 7: Hasil Cadangan Item Parameter Pengangkutan

Bilangan	Item
1	Ansuran pinjaman kenderaan (kereta)
2	Ansuran pinjaman kenderaan (motosikal)
3	Insuran dan cukai jalan kenderaan (semua jenis kenderaan)
4	Penyelenggaraan kenderaan
5	Baik pulih kenderaan
6	Minyak petrol/disel
7	Tambang teksi/e-hailing
8	Sewa kenderaan
9	Tol
10	Parkir
11	Saman
12	Pengubahsuaian/kosmetik kenderaan
13	Kerusi keselamatan kanak-kanak
14	Keretapi
15	Aksesori kenderaan

Jadual 8: Hasil Cadangan Item Parameter Perancangan Kewangan

Bilangan	Item
1	Hibah
2	Unit Amanah
3	Takaful hayat
4	Insuran nyawa
5	KWSP
6	Perkeso
7	Skim persaraan dan anuiti tertunda
8	Insuran pendidikan
9	Potongan SSPN
10	Bayaran balik pinjaman pendidikan
11	Tabung Haji
12	Potongan koperasi
13	Pelaburan emas

Jadual 9: Hasil Cadangan Item Parameter Gaya Hidup

Bilangan	Item
1	Melancong
2	Berkelah/bersiar-siar
3	Wayang gambar/karaoke/lan-lain
4	Langganan TV satelit (cth, Astro)
5	Langganan penstreaman video
6	Alat permainan kanak-kanak
7	Keahlian gimnasium/kelab golf/lain-lain
8	Fi fasiliti sukan
9	Fi pendaftaran penyertaan pertandingan
10	Berenang
11	Basikal
12	Peralatan perkhemahan

Jadual 10: Hasil Cadangan Item Parameter Lain-lain

Bilangan	Item
1	Yuran pusat penjagaan/asuhan anak
2	Bayaran alimoni kepada bekas isteri
3	Saguhati/pemberian tunai isteri dan anak
4	Kelengkapan Pam Susu
5	Sedekah - infaq

Kesimpulan

Hasil kajian menunjukkan bahawa perbelanjaan pada masa kini telah merangkumi pelbagai jenis item yang perlu diambil kira dalam tolakan zakat. Antaranya adalah perbelanjaan untuk komunikasi termasuklah telefon bimbit, komputer riba dan internet. Perbelanjaan ini telah menjadi satu keperluan dalam kehidupan pada masa ini. Hasil kajian ini akan dipersembahkan kepada ZPP bagi menimbang untuk diterima sebagai salah satu item tolakan pengiraan zakat pendapatan.

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GAME BASED LEARNING TO IMPROVE MATHEMATICS CONCEPTUAL UNDERSTANDING

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ABSTRACT

In many respects, computer games have infiltrated everyday life. Many studies and designed systems include features in the structure of the game that draw attention and fun, consequently enhancing student motivation in the field of educational learning. We shall provide many theoretical reasons supporting the benefits of using games in education and learning in this study. We will also distinguish between methodologies such as Game Based Learning (GBL), educational games, and Gamification in education. A clear definition of this new term will be offered, along with an explanation of the potential impacts on teaching and learning. Games can make learning concepts more enjoyable and provide a platform for students to improve their creative thinking. Games are frequently used as a learning trigger, stimulating conversation about the concept of learning among students after they have completed a game. Some new teaching methods, such as Games Based Learning and Gamification, can be used to boost the learning spirit of students of all ages. The purpose of this study is to identify research methods and the fields that the chosen articles on game-based learning cover. The fundamentals and characteristics of game-based learning, an overview of game-based learning from prior studies, the application of game-based education for students and teachers, conclusions, and suggestions for further study are also included in this article.

Keyword: Games Based Learning, Gamification, motivation, learning concept, enjoyable.

Introduction

Educational games are games that are designed and used to teach and learn. We can combine elements of fun and education concepts in educational games to increase student motivation and encourage them to be directly involved in this educational game. The usage of gaming in the classroom is the activity that encourages student-driven exploration. Increased motivation and student engagement are benefits of serious games, which are games designed with educational goals in mind (Young et al., 2012). Game-Based Learning (GBL) is thought to be more effective than traditional lecture teaching in terms of creating a better learning effect and increasing learning motivation. It is also possible to encourage students' problem-solving abilities and generate quality learner outcomes.

The traditional teaching method is no longer beneficial to students for a variety of reasons, including the inability of students to think outside the box. In the old teaching mechanism, students entirely focused on the exam rather than attempting to understand the concepts underlying those things. As a result, there is a need to allow students to learn in their own way rather than focusing on the exam without understanding the subject matter. Researchers have been persuaded to create a virtual learning environment to allow students to learn through experience (Jayasinghe & Dharmaratne, 2013). In

addition, research made by Shaikh et al. (2020) proved the impact of game-based learning in enhancing the motivation and attraction of school students to learn. Furthermore, Shaikh et al. (2020) demonstrated the effectiveness of game-based learning in increasing the motivation and interest of school pupils to learn.

Game-Based Learning (GBL) is actively utilised to encourage students to participate in learning while playing and to make the learning process more fascinating by including fun into the learning process. It is beneficial to cognitive development. GBL is an undeniable pedagogical attraction in the classroom. Its objective is to demonstrate additional intellectual gains from studying. In the mid-1800s, Friedrich Fröbel expressed the concept of learning through play and given rise to kindergarten (Wasmuth, 2018). One of the most defining characteristics of game-based learning environments is their ability to provide an effective and engaging learning experience (Andrew et al., 2020).

Kebritchi et al. (2010) looked at the results of implementing severe GBL in the pre-algebra math classroom in one study. The classroom teachers in this study believed that the use of serious gaming was successful because the games were experiential in nature, provided a fresh perspective on how to present and experience learning, provided the students with context and inspiration to work on the current mathematical concepts, and made math enjoyable. Additionally, studies show that game-based learning increases students' comfort levels in the classroom and enables them to interact with professors in ways they otherwise wouldn't be able to (Sprague, 2016). According to research (Muhridza et al., 2018; Partovi, 2019), game-based learning helps students acquire and adapt complicated abilities. Game-based learning environments have the potential to aid in the transmission of knowledge outside of the classroom. As a result, student participation in the classroom has increased. Students can learn cooperatively with their peers through game-based learning, which increases their engagement in the classroom (Zakaria et al., 2021).

Effects of game-based learning in mathematics

When faced with the direct delivery of mathematics teachings, the condition of students will become something abstract when accepted by students, resulting in many students whose scores do not meet the aim. There must be a suitable remedy for this situation to not be continued. The teacher's responsibility as a motivator is to find new ways to improve pupils' learning motivation. The guide note taking learning approach is one strategy that can be applied. The application of ICT technology to teaching processes, such as game-based learning (GBL), is viewed as one of the learning mediums that can engage students in mastering Mathematics. This technique can also help to build on a more understandable idea of learning (Steinmaurer et al., 2020). Hussin (2018) discovered that game-based learning improves student motivation. Liu et al. (2020) discovered in a game-based learning study that

educational institutions should use game-based learning to favour important personality traits such as conscientiousness in students.

The use of GBL in mathematics learning has numerous benefits that serve to improve the quality of the teaching and learning process. In comparison to the use of traditional gadgets, the use of innovative interactive units allows for more efficient learning (Kalogiannakis et al., 2021). Meanwhile, explicit learning objectives aligned with curricular standards, as well as student-centered implementation, make GBL more effective (Farber, 2015; Tan, 2018). Students will study mathematics effectively if they can independently build the concept of mathematics in a constructivist way. As a result, using GBL in mathematics teaching and learning assists students in developing self-awareness (Giannakas et al., 2018). GBL also offers an interactive technology-based learning process that allows students to play as they learn. As a result, GBL develops a positive desire and sense of self-efficacy towards mathematics. It also aids in the development of critical and creative thinking in students (Tokac et al., 2019). The GBL application encourages students to engage in problem-solving and self-learning to increase their competences and self-efficacy (Eseryel et al., 2014; Wu et al., 2014). Finally, this application will aid in the improvement of students' mathematical achievement.

Conclusion

GBL encourages students to learn a mathematical topic instinctively and to develop solid basic mathematical skills (Tokac et al., 2019). In this approach, students could learn basic mathematics ideas and skills while playing the game and completing the tasks, in addition to other key skills such as reading and problem-solving abilities. Such interactions will facilitate learning and skill acquisition (Byun & Joung, 2018). This shows that GBL can assist students improve their math skills. These are skills that go beyond traditional reading, writing, and arithmetic. It is not only what students must learn, such as shifting, but also how and when they must study. Students have grown up with laptops, tablets, cell phones, and video calls and expect to use them in their daily interactions.

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ELLY'S READER: LEARNING THROUGH MOBILE APPS

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ABSTRACT

Education and the learning process are very important. In the current era of technology, everything related to education and the learning process such as e-learning is also at the fingertips. Since early literacy and resources to help kindergarten children learn to read are limited, quite boring, ineffective, and still go through the traditional method, Elly's Reader is being developed to overcome these problems. Elly's Reader is a learning mobile application to help kindergarten students to read anywhere at any time effectively and quickly. The scope of the project is children from Tabika Kemas Kampung Kota Bukit. Surveys and the requirements needed are identified before the application is implemented to make sure that the functionality and usability of the application are applied. ADDIE Model is used in the development of Elly's Reader. The main purpose of Elly's Reader is to facilitate the process of teaching and learning not just to the students but also to the teachers and parents. By using Elly's Reader, children, teachers, and parents can handle the learning process effectively, quickly, and smoothly with a more enjoyable learning method.

Keywords: *learning mobile application, kindergarten children, Elly's Reader, ADDIE Model*

Introduction

The COVID-19 pandemic has created the largest disruption of education systems in human history, affecting nearly 1.6 billion learners in more than 200 countries. Closures of schools, institutions, and other learning spaces have impacted more than 94% of the world's children population (Pokhrel and Chhetri, 2021). This is disrupting the whole education system. Policymakers are facing many problems in making the policy related to the education system. Teaching is taking place from offline to online.

E-Learning describes any type of learning that relies on or is enhanced through online communication using the latest information and communication technology. This e-learning process is always launched and operated on a variety of e-learning platforms, including applications, websites, and web applications, but in many of these platforms, e-learning applications are the most user-friendly. An e-learning application is an interactive application that allows children to input data and gets expected results on their devices. In this technological age, children are also getting better at using applications like mobile games

that are installed on their or their parents' smartphones and tablets. However, due to this transformation in teaching methodology, children, teachers, and parents are facing many problems (Tarkar, 2020).

The beginning of learning to read is critical and must be implemented for children in order for their early learning to run smoothly. To overcome this, it is strongly demanded that there be further improvements to the strategies and methods applied by teachers in the learning process. One of the efforts that can be applied to improve children's thinking ability is Jerome Bruner's theory. There are four main concepts in this Jerome Bruner constructivist theory: representation of knowledge, discovery learning, categorization, and spiral curriculum (Metsämuuronen and Räsänen, 2018).

Elly's Reader is a learning mobile application which is being developed to overcome the learning problems where it focuses on teaching children how to read. According to Roslan et al. (2021), in their research on learning to read mobile applications, they mentioned a few steps and requirements that the application must meet. The sophistication of information technology in delivering information quickly, accurately, and interestingly in the form of multimedia creates an attraction towards creating a more enjoyable learning atmosphere and greatly influences the current learning pattern.

In terms of learning to start reading, this learning approach focuses on various methods that make children more productive and more effective due to the presence of various elements that will attract children to deepen the application. Not only that, but it can also help children strengthen their speaking skills and confidence to communicate with people. Learning through this application creates a three flexible learning environment where children can choose when and where they want to learn.

Project scope

Data collected during this phase can be used to make decisions about how to improve current business processes to better meet user requirements. A face-to-face interview was done via questionnaire to gather information such as problem statements and the organization's present business process.

The main objective of this phase is to collect data and gain a detailed understanding of Tabika Kemas Kampung Kota Bukit's problems before suggesting solutions based on the proposed project. Problems have been identified where the reading learning process at the Community Development Department's (KEMAS) Children's Nursery (TABIKA) Kampung Gajah Puteh today continues the traditional learning method for reading using some of the learning materials provided by the kindergarten management, such as textbooks and exercise books. The teachers there also use the whiteboard to write all the words. In addition, they also teach children to read using word paper. The word papers containing 26 words will be laminated and given to the children to be read at home.

Thus, based on the problems, a face-to-face interview session have been done to the teacher at Tabika Kemas Kampung Kota Bukit. A questionnaire is used to conduct the interview. During the interview, all crucial information is gathered and recorded, such as the current business process and the problems they

have with the traditional learning-to-read method in the kindergarten.

Three main users for Elly's Reader mobile application have been identified based on the interview done: children, teachers, and parents.

Children

Kindergarten children can learn to read directly through this application. This mobile application consists of three modules, namely beginner, intermediate, and advanced. The content in this beginner module is more about alphabetical identification and alphabetical sound recognition. The intermediate module is for children who already know and remember the alphabet and can pronounce it well and fluently. Finally, in the advanced module, children can pronounce syllables fluently without having to spell, and it is more of an exercise for children to learn to read sentences or stories more fluently.

Teachers

Teachers can also use this Elly Reader application to teach children to read in kindergarten. It can be used as one of the activities or learning materials in the class where teachers can install the application on a tablet and connecting it to a projector and slides. In addition, this application can also be used outside of kindergarten hours as an activity or homework that is assigned by the teachers.

Parents

This mobile application can be used by parents to see their child's early literacy development over time. Parents also can spend time with their children and see for themselves the development of their children by using this application and trying to practice the exercises in this application face-to-face.

Methodology

To build this Elly's Reader Application, The ADDIE model for instructional design is implemented. ADDIE model is one of the instructional design models used by many researchers to develop software or applications related to the field of education (Muhamad Azhar Stapa and Nazeri Mohammad, 2019). Each process needs to be finished before moving on to the next phase. Analysis, Design, Development, Implementation, and Evaluation are the 5 phases of the ADDIE model instructional design. Below is the project framework for the application.

Table 1.1 Project Framework for the Application

Project Framework	Activities	Method used	Outcomes
Analysis	<ul style="list-style-type: none"> Analyze the needs and front end to see all the things that could affect the study. Analyze the scope of the project. Analyze the characteristics and interests of kindergarten children. Analyze the educational process's objectives. Analyze the problem statement. Analyze the current flow process. 	<ul style="list-style-type: none"> Literature study one-learning and application in articles and journals. Interview teachers using closed-ended and open-ended questions. 	<ul style="list-style-type: none"> The needs and front end are identified. The scope of the project is analyzed. The characteristics and interests of kindergarten children are identified. The educational process's objectives are identified. Problem statements are identified such as burdensome traditional methods uninteresting elements and learning materials, lack of content, and so on. The current process's flow is analyzed.
Design	<ul style="list-style-type: none"> Designing Model Use Case diagrams Designing Story Board Designing application interfaces 	<ul style="list-style-type: none"> Designing tools such as Adobe Animate and Canva. 	<ul style="list-style-type: none"> Model Use Case Diagram Story Board Application Interface
Development	<ul style="list-style-type: none"> Develop Beginner, Intermediate and Advanced modules in the application. Develop interesting and varied learning and training materials in the application based on the modules. 	<ul style="list-style-type: none"> Develop this mobile application using several tools such as Android Studio and Adobe Captivate 	<ul style="list-style-type: none"> There are three modules in the application that follow the child's readability level, which is Starter, Intermediate and Advanced Interesting learning and Training materials that follow modules are developed in this application such as alphabetic puzzles, alphabetic matches, and others.
Implementation	<ul style="list-style-type: none"> Test applications on users such as teachers and parents. The verification process by the user. 	<ul style="list-style-type: none"> Test application 	<ul style="list-style-type: none"> This application has been tested by teachers and parents. The verification process by the user result.
Evaluation	<ul style="list-style-type: none"> Performing usability testing and expert evaluations. 	<ul style="list-style-type: none"> Usability testing Expert evaluation 	<ul style="list-style-type: none"> Usability testing and expert Evaluation result.

Similar Existing Systems

Similar existing systems are studied to determine their problems, weaknesses, and strengths so that the new system will be better and more effective. The research also enables the researcher and developer to decide and choose which features of the purpose system can be used. The researcher and developer can also have the same experience as a real user of the system, so from that, they will find which parts of the system they want to remove or repair to make the system more user-friendly and flexible. The problem with the existing system can be avoided when developing the new system. This will improve the new system's user satisfaction, efficacy, and efficiency.

Kids Learn to Read Lite

Kids Learn to Read Lite, or Learn to Read with Tommy Turtle, is a fun game for preschool-aged children that encourages them to blend sounds into words, read and make simple words, identify spoken words, and learn word families. This mobile learning-toread application for children focuses more on letter sounds for early children's learning. It contains few sections. Unfortunately, some sections are only available in the full version, which requires users to subscribe before they can use them.



Figure 1.1 Kids Learn to Read Lite Mobile Application

Endless Reader

The Endless Reader application introduces "sight words," which are the most often used words in school, the library, and children's books. To attain reading fluency, children must be able to recognise these words by sight. Recognizing sight words is beneficial for beginner readers because many of these words have strange spelling, cannot be sounded out using phonics knowledge, and are frequently unrepresentable with pictures. With the cute Endless Monsters, children will have a blast learning sight word, as well as their context and usage. Each word has an interactive word puzzle with letters that come alive, followed by a sentence puzzle

with words that transform into what they describe. Endless Reader, on the other hand, was created with children in mind. There are no high scores, failures, constraints, or stressful situations. Children can use the app at their own pace. Unfortunately, the user must always be online and must have sufficient disk space while running the app to get all the words user purchase in the app.

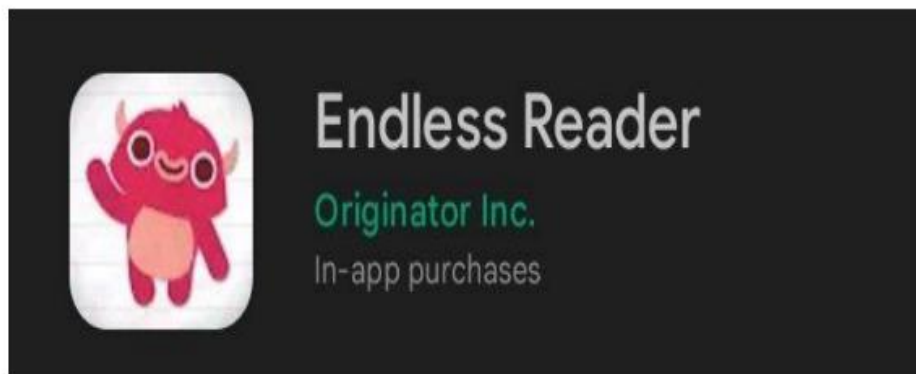


Figure 1.2 Endless Reader

Reading Eggs – Learn to Read

Reading Eggs is a fun and interactive mobile reading app. This app uses interactive reading games, guided reading lessons, entertaining activities, and over 3,000 digital storybooks to help kids learn to read. This app requires the user to have a full subscription to use it. This type of learn-to-read mobile app is beneficial to children because it is self-paced, which means that children are matched to the appropriate level and progress at their own pace.

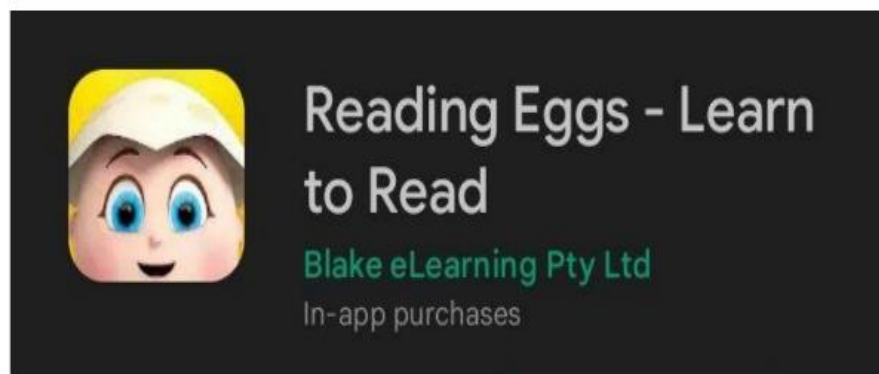


Figure 1.3 Reading Eggs – Learn to Read

Table 1.2 Comparison Elly's Reader with Similar Existing System

Characteristics	Similar Existing System			Purpose d System (Elly's Reader)
	Kids Learn to Read Lite	Endless Reader	Reading Eggs – Learn to Read	
Subscription required	Yes	Yes	Yes	No
Free Content Access	Half	Half	None	Full
Access to Internet	Always	Always	Always	Always
User Age Category	No	No	Yes	No
Multiple Section or Activities	Yes	No	Yes	Yes
Level of User Readability	No	No	Yes	Yes
Score Activities	No	No	Yes	Yes
Can be Monitored by Teachers	No	No	No	Yes
Interesting Content and Activities	Yes	Yes	Yes	Yes
User Friendly and Easy to Use	Yes	Yes	Yes	Yes
Interesting and easy-to- understand background sounds and music.	Yes	Yes	Yes	Yes

Conclusion

The traditional method of learning reading among children is one of the learning methods provided in Tabika Kemas Kampung Kota Bukit. The main problem is that it is less effective and does not arouse the interest of children. Using Elly's Reader application, the process of learning children's reading and the teacher's teaching process is easier, more effective, and faster than traditional methods. The application is user-friendly where it is understandable to children, teachers, and parents even though there are elderly users who are not familiar with the app, but the functionality and interface are easy to use and can be accessed anytime and anywhere. ADDIE model has been chosen as the guideline to finish this project which consists of five phase which are analysis, design, development, implementation, and evaluation, was chosen as the methodology for this mobile application Comparisons were also made between three similar existing applications to give the developer an early idea of how the mobile application should work. In the end, a questionnaire was created for testers to determine whether the mobile application's flow, interfaces, functionality, contents and exercises, efficiency, and navigational and multimedia elements meet their expectations.

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EARLY DETECTION OF HEART DISEASE USING RANDOM FOREST ALGORITHM

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ABSTRACT

The prediction of heart diseases is a crucial aspect of healthcare, as it helps medical professionals to diagnose and treat the condition at an early stage. This is a preliminary study that aims to investigate the Random Forest Algorithm (RFA) that accurately predicts the presence of heart diseases, enabling healthcare providers to take proactive measures to prevent severe health complications and improve patient outcomes. RFA as a machine learning classification model has the potential to provide more accurate predictions than traditional methods. This potential has been investigated by thoroughly compared with several other studies across implementation of different types of dataset and algorithms. Furthermore, additional prototypes could be used in clinical settings, providing valuable insights to healthcare providers and contributing to the advancement of medical research.

Keywords: *heart disease, random forest algorithm, classification algorithm, prediction analysis*

Introduction

The cardiovascular system in the human body consists of the heart and blood vessels. Endocarditis, rheumatic heart disease, and conduction system abnormalities are just a few of the problems that can arise in the cardiovascular system. Cardiovascular diseases (CVDs), also known as heart diseases are group of disorders of the heart and blood vessels refers to the several conditions; 1) Coronary Artery Disease (CAD); 2) Cerebrovascular Disease (CVD); 3) Peripheral Artery Disease (PAD); and 4) Aortic Atherosclerosis (Atherosclerosis of the Aorta).

The current consumerism and technology-driven culture, which is associated with longer work hours, longer commutes, and less leisure time for recreational activities, may explain the significant and steady increase in CVD rates over the last few decades. According to WHO in 2019, an estimated 17.9 million people (representing 32% of all global) died from CVDs. Physical inactivity, a high-calorie diet, saturated fats, and sugars are specifically linked to the development of atherosclerosis and other metabolic disturbances such as metabolic syndrome, diabetes mellitus, and hypertension, all of which

are common in people with CVDs (Curry et al., 2018). Most cardiovascular diseases can be prevented by addressing behavioural risk factors such as tobacco use, poor diet and obesity, physical inactivity, and excessive alcohol consumption. Early detection as possible is crucial in order to arrange treatment such as counselling, self-care support and medication (Riegel et al., 2017).

According to Xie et al. (2022) heart disease risk soars after COVID even with a mild case, where people who had recovered showed stark increase in 20 CVDs problems. For example, 50% more likely to have stroke and heart attack than those in contemporary control group. The major challenge in heart disease is its detection and managing it are very extensive depending on clinical situation. Early detection of heart diseases can decrease the mortality rate and overall complications. Furthermore, early detection is critical for providing strong education on the importance of second prevention through risk factor and lifestyle modification (Lopez et al., 2022). There are tools that can predict heart disease, but they are either expensive or ineffective at predicting the possibility of heart disease in humans. However, because it takes more insights, time, and expertise, it is impossible to accurately monitor patients every day in all circumstances and consult with patients for 24 hours when there are no doctors available. In the modern world, we have a lot of data, so we can use a variety of machine-learning algorithms to examine the data and look for hidden patterns. In medical data, the hidden patterns can be used for health diagnosis.

Random Forest Algorithm for Prediction Analysis

Random forests are a combination of machine learning algorithms. These are combined with a subset of tree classifiers, each of which cast a unit vote for the most popular class, the final sort result is then obtained by combining these results. High classification accuracy, good noise and outlier tolerance, and no overfitting are all characteristics of random forests. In both data mining and biological fields, random forests have been one of the most widely used research techniques (Liu et al., 2012).

Random Forest is a popular ensemble machine-learning algorithm that is used for both classification and regression tasks. It is based on the concept of decision trees, which are simple yet powerful models that can be used to make predictions by recursively partitioning the data into subsets based on the values of the input features. The key idea behind Random Forest is to train multiple decision trees on different subsets of the data and then average or vote on their predictions to improve the overall performance of the model.

What is Decision Tree?

The Random Forest model grows a "forest" out of several decision trees. One more algorithm used to categorize data is a decision tree. It starts at a single point and branches off into two or more directions,

with each branch of the decision tree offering a different possible outcome. To put it simply, think of it as a flowchart that clearly illustrates a pathway to a decision or outcome (Meltzer, 2021).

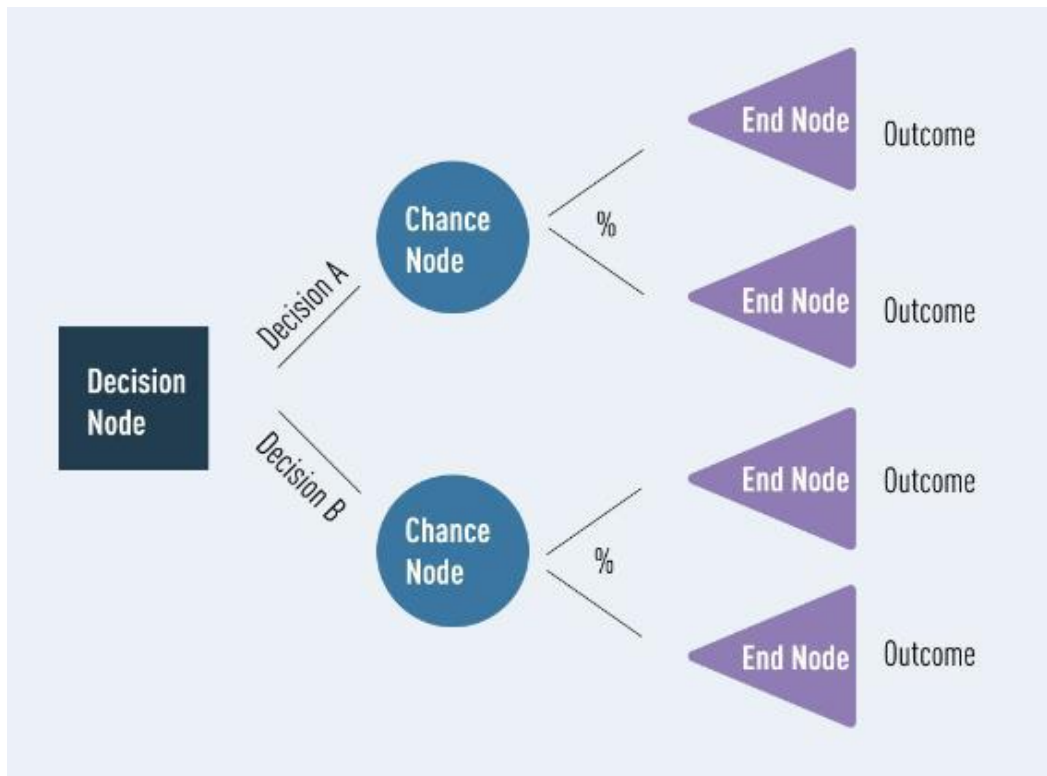


Figure1: Flow of Decision Tree (Source: Hillier, 2021)

For a more precise prediction, Random Forest grows multiple decision trees that are then combined. The Random Forest model is based on the idea that multiple uncorrelated models (the various decision trees) work much better together than they do separately. Each tree provides a classification or a "vote" when using Random Forest for classification. The classification with the most "votes" is chosen by the forest. When performing regression using Random Forest, the forest selects the average of all tree outputs (Meltzer, 2021).

The way Random Forest algorithm works is as follows:

1. **Bootstrapping:** The first step in training a Random Forest is to create multiple subsets of the data, called bootstrap samples, by randomly selecting data points with replacements. Each decision tree in the forest is trained on a different bootstrap sample, which helps to reduce overfitting by introducing randomness into the training process.

2. Feature Randomness: When training each decision tree, the Random Forest algorithm also randomly selects a subset of the features to use for splitting each node. This process, known as feature randomness, helps to decorrelate the trees and further increase performance.

3. Training: Once all the decision trees are trained, the Random Forest algorithm combines their predictions by averaging them (for regression tasks) or voting on them (for classification tasks).

4. Prediction: Finally, the Random Forest returns the combined prediction as the final output. Figure 2 is depicted the concept of how the random forest algorithm mechanism for prediction analysis.

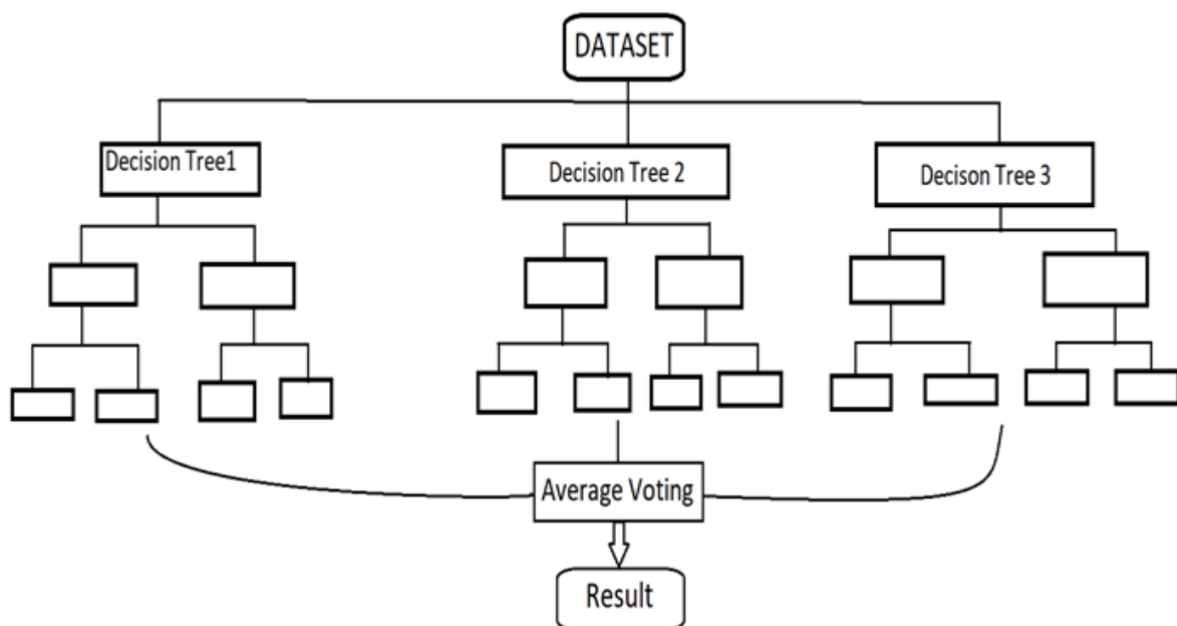


Figure 2: Mechanism of prediction using Random Forest Algorithm

The beauty of Random Forest is that, it can handle large data sets with higher dimensionality by creating multiple decision trees (forest) and making predictions by taking the average or majority of the predictions. It also helps to reduce overfitting which is a common problem with Decision Trees.

Discussion and Conclusion

The aim is to see the effectiveness of Random Forest in making predictions and how accurately it can perform. Thus, comparison has been made with several difference studies in order to investigate the usefulness and performance of the RFA across different implementation. Table 1, summaries several the performance of RFA across different studies.

Table1: RFA implementation for predictive analysis and performance across several studies

No	Title	Problem	Algorithm	Result	Reference
1	An Ensemble Random Forest Algorithm for Insurance Big Data Analysis	Algorithms for classifying data, such as logistic regression and support vector machines, are challenging to use when modelling insurance business data (SVM)	<ul style="list-style-type: none"> • Random forest • SVM 	The ensemble random forest algorithm outperformed SVM and other classification algorithms in both performance and accuracy within the imbalanced data	(Lin et al., 2017)
2	Early Diagnosis of Breast Cancer Prediction using Random Forest Classifier	Late prediction of Breast Cancer may greatly reduce survival chances and machine learning algorithm for earlier prediction method is necessary and some algorithm was explored such as Random Forest.	Random forest	The patients are classified and a final accuracy of 98% is obtained.	(Anisha et al., 2021)
3	Random Forest Classifier for Remote Sensing Classification	Compare accuracy between Random Forest and SVM	<ul style="list-style-type: none"> - Random forest - SVM 	The result given by RF is 88.37% while SVM is 87.9%.	(Pal, 2005)

According to the analysis in Table 1, the RFA is one of the outstanding predictive algorithms in area of medical, insurance and remote sensing data. This information suggested that the RFA is preferable to be implemented in any robust and difficult data analysis.

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FAKTOR PEMILIHAN DAN FAEDAH *HOMESCHOOLING*

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ABSTRAK

Salah satu alternatif pendidikan bagi anak-anak pada masa kini adalah *homeschooling*. Berbeza dengan kaedah pembelajaran pendidikan formal secara umumnya, *homeschooling* menggunakan kaedah belajar dan mengajar di rumah. Melalui *homeschooling* ini, ibubapa boleh menentukan sendiri kaedah pembelajaran yang sesuai kepada anak-anak mereka mengikut kemampuan, gaya pembelajaran dan minat anak-anak mereka sendiri. Selain itu, ibubapa boleh mengajar anak mereka sendiri atau menjemput tenaga pengajar ke rumah untuk mengajar anak mereka bersesuaian dengan sistem pendidikan formal. *Homeschooling* merupakan kaedah belajar yang mempunyai manfaat yang sama seperti pendidikan formal cuma ianya berlangsung dari rumah. *Homeschooling* dapat menanamkan rasa seronok untuk belajar dengan memberikan kebebasan belajar dengan memilih tempat dan masa yang bersesuaian. Ia juga dapat memberi kesedaran kepada ibubapa bahawa belajar bukan hanya dapat dijalankan secara formal tetapi ia juga dapat dijalankan secara terbuka dan santai termasuk di rumah. Walaubagaimanapun, kaedah ini masih dianggap baru di Malaysia dan ramai ibubapa masih belum terdedah dan faham akan kaedah *homeschooling* ini. Oleh yang demikian, tujuan kajian ini dijalankan adalah untuk mengkaji faktor-faktor yang menyebabkan kaedah *homeschooling* ini menjadi pilihan ibubapa pada masa kini dan mengkaji faedah pembelajaran secara *homeschooling*. Kajian ini diharapkan dapat memberi sedikit pendedahan kepada ibubapa tentang konsep *homeschooling* dan memberi pilihan kepada ibubapa untuk menyediakan pendidikan kepada anak-anak dengan cara yang terbaik.

Keywords: *Homeschooling, kaedah pembelajaran, faedah, kualiti*

Pengenalan

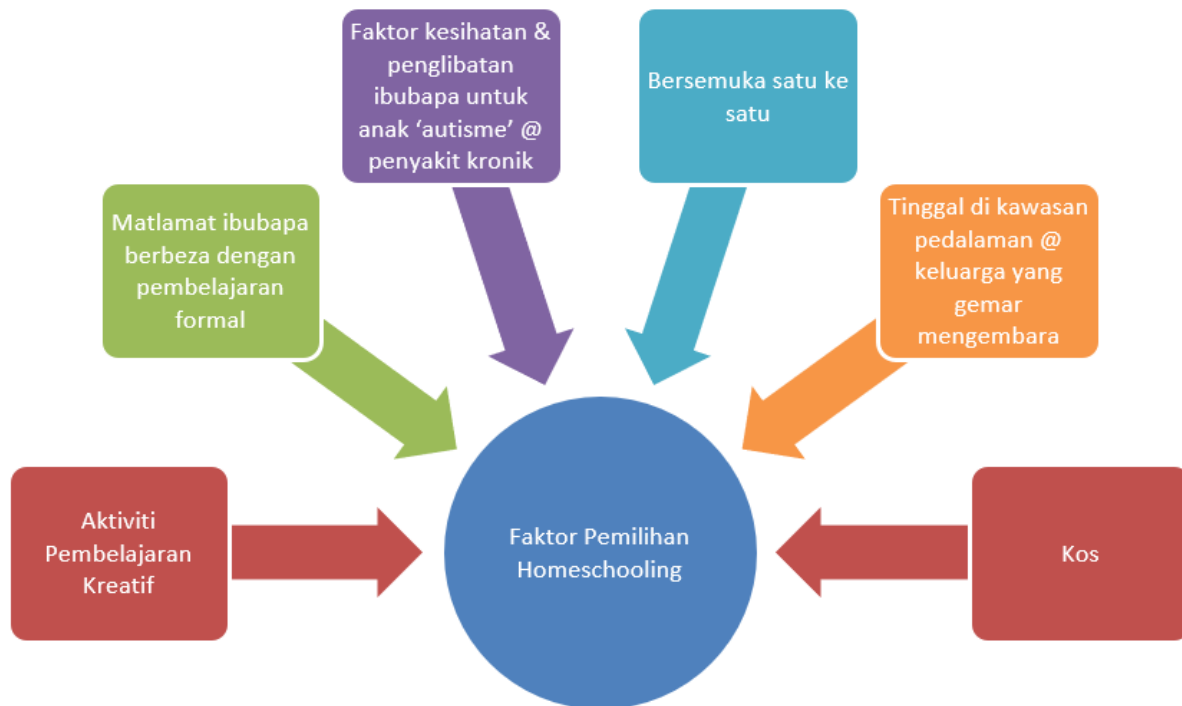
Pendidikan formal atau *homeschooling* merupakan kaedah pembelajaran yang boleh dipilih oleh ibu bapa untuk anak-anak mereka. *Homeschooling* merupakan satu kaedah alternatif kepada pendidikan formal dan merupakan pendidikan kepada anak-anak di rumah. Ia bukanlah kaedah baru dalam pembelajaran tetapi telah digunapakai di kebanyakan negara sejak tahun 70-an lagi. Namun di Malaysia ia masih dianggap baru dan ibubapa masih belum ada pendedahan dengan kaedah ini. Realitinya, kini *Homeschooling* telahpun dilaksanakan oleh sebilangan kecil ibu bapa di Malaysia (Ruslina Ibrahim, Yusliza Baharin, Deny Indahsari, Saedah binti Siraj, & Norlidah binti Alias, 2011). Oleh itu, jika ada persoalan, yang manakah kaedah yang terbaik? Ianya sangat sukar untuk dijawab kerana kedua-dua mempunyai kelebihan dan kualiti masing-masing.

Di Malaysia terdapat 9 jenis sekolah yang menjalankan sistem pendidikan secara formal iaitu sekolah kebangsaan, sekolah jenis kebangsaan, sekolah agama, sekolah mubaligh, sekolah model khas, sekolah pendidikan khas, sekolah teknik dan vokasional dan sekolah berasrama penuh (MOE, 2010). Sistem pendidikan secara formal adalah pendidikan yang dijalankan di sekolah untuk mencapai matlamat tertentu. Sistem pendidikan yang dijalankan adalah seiring dengan perkembangan dan kemajuan zaman. Manakala pendidikan tidak formal adalah pembelajaran yang diajar secara tidak langsung melalui aktiviti harian (Azizi & Nurfaizah, 2011). Justeru itu, tidak dapat dinafikan *homeschooling* adalah satu bentuk pendidikan yang mampu untuk mengambil tempat dalam aliran pendidikan satu masa nanti.

Jika *homeschooling* menjadi pilihan, ibubapa dan anak-anak mestilah mempunyai sikap disiplin yang tinggi terutamanya dari segi masa. Mungkin ramai orang berpendapat bahawa anak-anak akan lebih berdisiplin jika pergi ke sekolah kerana anak-anak hanya mengikut jadual yang telah ditetapkan oleh pihak sekolah. Tetapi sebenarnya tidak. Ini kerana anak-anak perlu melatih diri supaya lebih berdisiplin apabila belajar di rumah dengan mengikuti semua peraturan yang telah ibubapa tetapkan. Namun, semua itu terletak pada ibubapa itu sendiri kerana jika ibubapa bersikap tegas terhadap anak mereka maka pastinya ia akan membuahkan hasil. Namun, jika ibubapa meletakkan rasa kasihan dan kasih sayang terus terhadap anak, maka hasilnya pasti tidak jauh berbeza dengan pendidikan di sekolah malah mungkin menjadi lebih buruk. Oleh yang demikian, sebagai ibubapa mestilah bersiap sedia dari segi mental dan fizikal serta memikirkan kesan dari setiap pilihan yang diambil.

Perbincangan

Rajah 1 menunjukkan faktor pemilihan *homeschooling*. Jika melihat kepada faktor-faktor ibubapa memilih kaedah *homeschooling* ini yang pertamanya adalah kerana kos yang lebih rendah dan menjimatkan. Sekiranya pendidikan formal pastinya memerlukan kos yang lebih besar dalam setahun kerana perlu membayar yuran tahunan, buku, pakaian seragam sekolah, aktiviti kokurikulum dan wang perbelanjaan untuk anak-anak seharian. Tambahan pula sejak dari fasa perintah kawalan pergerakan (PKP) sebelum ini menjadikan ramai ibubapa yang kehilangan pekerjaan. Jadi sejak dari itu ramai ibubapa sudah terbiasa dengan mengajar anak-anak mereka sendiri dan mereka merasakan bahawa mengajar anak-anak mereka sendiri lebih berkesan dan berbaloi. Ini antara sebab mengapa ibubapa memilih *homeschooling* sebagai kaedah pembelajaran terhadap anak-anak.



Rajah 1 : Faktor Pemilihan Homeschooling

Selain itu, ibubapa juga mempunyai matlamat mereka masing-masing. Mereka mahu mendidik dan membentuk perwatakan anak-anak mengikut cara mereka sendiri. Ada segelintir ibu bapa memilih *homeschooling* kerana kurang berpuas hati dengan faktor persekitaran di sekolah dan akhlak pelajar di sekolah, yang mana mereka ingin memberikan fokus didikan agama kepada anak-anak dan merasakan tidak berpuas hati terhadap sistem persekolahan yang ada. Tetapi bukan bermaksud mereka tidak mengendahkan dengan tahap penguasaan akademik anak-anak. Ini kerana akademik sangat penting untuk mencapai cita-cita dan mendapatkan pekerjaan yang terbaik demi meneruskan kehidupan anak-anak pada masa akan datang. Ray, 2009 pula menyatakan bahawa kebanyakan ibubapa menegaskan bahawa ianya menjadi tanggungjawab mereka untuk memberi kaedah pendidikan yang terbaik bagi anak-anak mereka dan ianya bukannya tanggungjawab dari pihak lain.

Homeschooling juga merupakan satu pilihan untuk mereka yang tinggal di kawasan pedalaman yang jauh dari sekolah, berpindah sementara di luar negara atau dari keluarga yang aktif bersukan atau mengembara yang tidak dapat memberi komitmen kepada pembelajaran formal. Surat pekeliling Ikhtisas Bil 2/2005 pula menyatakan bahawa *homeschooling* adalah merupakan satu kaedah persekolahan di rumah yang diberikan kepada anak-anak yang memerlukannya seperti mempunyai masalah kesihatan yang kronik dan memerlukan jagaan rapi oleh ibubapa atau penjaga.

Akhir sekali faktor yang dapat dilihat yang menjadikan *homeschooling* pilihan ibubapa adalah kerana pembelajaran yang bersemuka satu ke satu dan teknik yang digunakan semasa belajar yang lebih kreatif. Ibubapa boleh menggunakan kreativiti masing-masing untuk mengajar anak mereka seperti menggunakan permainan. Ini kerana permainan sangat bagus untuk meningkatkan kemahiran berfikir mereka malah dapat menaikkan semangat anak-anak untuk belajar dan menjadikan mereka sentiasa berfikir di luar kotak.

Oleh yang demikian, dari faktor-faktor yang telah dikaji ini dapat dilihat juga faedah yang diperolehi dari kaedah *homeschooling*. Jadual 1 menunjukkan faedah yang diperolehi dari kaedah *homeschooling* ini:

Jadual 1 : Faedah Homeschooling

Waktu belajar yang fleksibel	Salah satu kelebihan <i>homeschooling</i> adalah waktu pembelajaran yang fleksibel. Ibubapa, anak-anak atau tenaga pengajar dapat menentukan masa yang sesuai untuk memulakan pembelajaran dan menetapkan tempoh masa pembelajaran.
Anak boleh mengembangkan bakat sendiri	Ibubapa dan anak-anak dapat menetapkan sendiri jadual, subjek, tempoh masa belajar dan juga cara belajar yang sesuai dengan minat, kemampuan dan teknik pembelajaran anak. Ini kerana setiap anak mempunyai bakat, minat dan kemampuan yang berbeza.
Anak boleh mendapatkan rehat yang cukup	Rutin seharian sekolah formal memerlukan anak-anak untuk datang seawal pagi dan pulang kadang kala pada lewat petang. Ini menjadikan waktu rehat untuk anak sangat kurang dan ini menjadikan kualiti anak untuk fokus dalam kelas terganggu. Jadi dengan <i>homeschooling</i> anak dapat mengikuti pembelajaran dengan optimal.
Ibubapa boleh mengawasi pergerakan dan pergaulan anak-anak	<i>Homeschooling</i> membolehkan ibubapa mengawasi pergerakan dan pergaulan anak-anak. Anak-anak juga bebas dari risiko pergaulan bebas dan juga masalah buli di sekolah.
Anak boleh belajar di luar rumah	Berbeza dengan pendidikan formal yang pelajar perlu berada di sekolah, <i>homeschooling</i> memberi peluang untuk anak belajar luar dari kawasan kebiasaan contohnya seperti di perpustakaan, atau pun di halaman terbuka.

Kesimpulan

Kesimpulannya, pendidikan adalah sangat penting kepada anak-anak tidak kiralah anak-anak belajar secara formal di sekolah ataupun secara *homeschooling*. Apa yang lebih penting yang perlu diberi penekanan adalah adab dan akhlak anak-anak itu sendiri. Ibubapa merupakan model yang terbaik untuk anak-anak untuk dijadikan contoh teladan sepanjang hayat. Oleh itu, sebagai ibubapa jadilah guru yang terbaik kepada anak-anak agar mereka menjadi insan yang berbakti bukan sahaja kepada ibubapa itu sendiri tetapi juga kepada masyarakat.

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DESIGN FOR BUSINESS ANALYSIS OF PRODUCT SALES DATA

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ABSTRACT

Design for Business Analysis of Product Sales Data is a combination of theory and real-world experience to educate on how to choose a dynamic mix of procedures and techniques to do business successfully and efficiently. This study focuses on local retail company named Syarikat Daya Maju Bintang (DMB). The main issue that this retailer face is that some items are not sold out. In other words, some products are purchased less frequently by customers. So overcome these issues, business analysis approach is suggested. The main aim of this analysis is to identify the categories of products and sales for DMB. Besides that, a prediction model using product sales data technique and to visualize the result based on the proposed model. Cross Industry Standard Process for Data Mining, or CRISP-DM, is an industry-recognized method of directing data mining activities. These CRISP-DM include modeling, evaluation, and deployment as well as business understanding, data preparation, and data understanding in solving those issues. As a result, with is design business analysis, DMB may can improve its company performance and compete with other retail stores.

Keywords: *business analysis, business intelligence, AI, dashboards, data mining*

Introductions

Faisal Mohamed Sahid runs Syarikat Daya Maju Bintang (DMB), a retail company that sells a variety of everyday necessities. It was established in the Bukit Minyak SME industry in Bukit Mertajam, Penang, in 2019. Encik Faizal starts with a 'belacan' factory before expanding into a retail business due to his high profits. Because of its success in selling 'belacan,' DMB made a large profit. As a result, Mr. Faizal wishes to expand his business by opening a retail store. Mr. Faizal completely relied on his wife, Puan Rahayu Azura Binti Ibrahim, to run the form shop and retail business. As a result, the retail shop has been open for more than three years and is still growing and flourishing. DMB has spent money on a POS system to record sales results and provide sales receipts to customers in order to manage sales. DMB can only afford to purchase a POS system with limited use due to its limited capital. This POS system aids Puan Rahayu in analyzing the sales results of goods in her shop. Every item sold in the shop

on a daily basis is recorded in the POS system, but the data cannot be stored in other apps, such as Microsoft Excel, as in other businesses.

DMB continues to grow its business, but there are still problems it faces. The owner of a grocery store found that when it came time to stock items every month, there were items that met the sales target and items that did not reach the sales target. To provide a clearer picture, the store's wares are separated into two classes: dry products and wet items. Dry goods, such as canned food, mineral water, rice, sugar, salt, soy sauce, toothpaste, face wash, oyster sauce, cookies, and countless other items, are durable supplies. Wet commodities, such as seafood, poultry, red meat, seafood, vegetables, eggs, and seafood, are non-durable materials. The shop owner is concerned that he may have to discard unsold perishable items due to spoilage and the inability to sell any unsold wet items. This is how the shop loses money if its stock of perishable items doesn't move quickly enough.

To help the DMB shop owner, a business intelligent approach will be approached to identify product categories and sales for DMB using sales data analysis techniques. These research objectives have been established as to identify DMB's current problem and product sales demand besides to develop a predictive model using a predictive technique and finally to visualize the outcome based on the DMB prediction model. The expected outcome of this research is to build a dashboard that will show which product categories do well in DMB. The findings of this study have the potential to guide and implement changes that will increase sales and marketing at DMB

The Wikipedia describe the term "business intelligence" which also known as BI, refers to the collection of data, computation, and analytical functions used within the context of business operations. It is a broad term that refers to the procedures and techniques for gathering, storing, and analyzing data obtained from operations or business activities to improve performance. BI was introduced by Howard Dresner (later a Gartner analyst) in the mid-1990s. Business intelligence helps companies plan for a brighter future. Organizations can improve their ability to predict market trends and customer purchasing habits by investing in superior business intelligence software and equally trained employees to manage these technologies. It is an all-encompassing phrase that refers to the procedures and techniques for gathering, storing, and evaluating data acquired from operations or business activities to enhance performance (Pratt, 2019). Following in the footsteps of practitioners, research into the adoption, utilization, and success of BI systems has expanded significantly over the last two decades (NoorUl Ain, October 2019,).

Contextual information BI can be evaluated to obtain real data that can help organizations and product owners make decisions. A collection of facts and statistics used for analysis or research is referred to as data. They can be stored and transmitted as electrical signals after being recorded on magnetic, optical, or mechanical storage media. Data mining (DM) is a method for analyzing and discovering meaningful information about various features of various components. DM is the process

of deriving actionable intelligence from vast stores of previously collected data (Fayyad, 1996). Data mining is a powerful technique for extracting meaningful information from massive data sets, but it must be used responsibly.

There is few similar existing research that been referred as guidance while developing this approach for DMB shop. Oryza Wises and friend in their papers titled Prediction Analysis Sales for Corporate Services Telecommunications Company using Gradient Boost Algorithm had discussed about Sales Predictive Analysis that helps to achieve the results of this analysis are expected to generate reliable, accurate and effective forecasting data, a valuable resource for sales predictions.

Predictive Analysis for Big Mart Sales Using Machine Learning Algorithms is a paper written by Ranjitha and Spandana that explain about how to do predicting sales and creating a sales strategy may assist in preventing unexpected cash flow and managing production, staffing, and finance requirements more efficiently. Meanwhile, Raden and Andry teach how to identify the patterns of the market and predict the potential of the region in the national market commodities. in their paper Sales Prediction Model Using Classification Decision Tree Approach for Small Medium Enterprise Based on Indonesian E –Commerce Data. Based on those papers dan other further studies, dashboard for DMB has been approached.

Methodology

A Gantt chart is useful for project planning and scheduling because it allows to track how long the project will take, determine the resources needed, and plan the order in which tasks will be completed. To complete the project, six phases must be highlighted and followed as a guideline. Preliminary research, data collection, data pre-processing, analysis, dashboard design, and documentation are the stages. Each phase of the activity must be completed in order to monitor the project's progress and set priorities.

The CRISP-DM methodology will be applied for this project. The phases consist of business understanding, data understanding, data preparation, modelling, evaluation, and deployment. Data mining initiatives may be carried out according to a disciplined and well-defined approach thanks to the widely utilized technique known as Crisp DM. As for now, this study is still in a level of phase two which is data collections. Figure 1 below show the activities in CRISP-DM meanwhile in table 1 shows the detail description about the activities is being discuss.

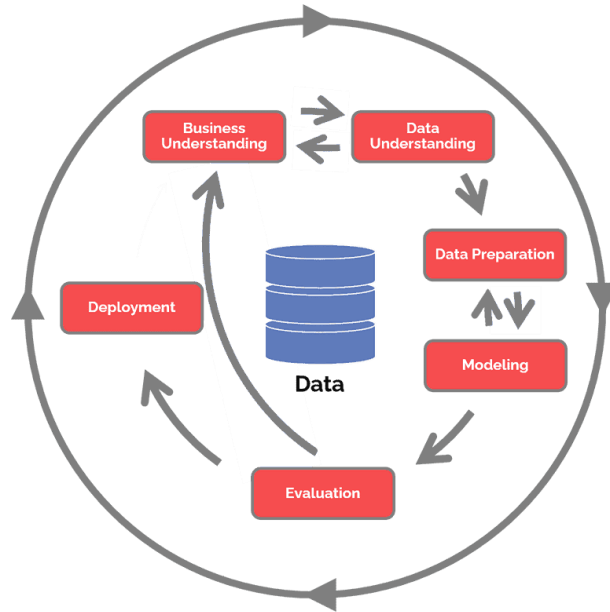


Figure 1: Phases of CRISP-DM

Table 1: Description for activities in CRISP-DM

Phase	Activity
Business Understanding	i. Identify processes and goals. ii. Assess situation. iii. Identify problem. iv. Define data mining goals.
Data understanding	i. Data collection. ii. Data exploration. iii. Data description.
Data Preparation	i. Select data. ii. Clean data. iii. Construct data. iv. Integrate data. v. Format data.

Modeling	<ol style="list-style-type: none"> i. Select modeling techniques. ii. Predicting. iii. Build model. iv. Assess model.
Evaluation	<ol style="list-style-type: none"> i. Evaluate result. ii. Review process. iii. Determine the next step.
Deployment	<ol style="list-style-type: none"> i. Method deployment. ii. Develop dashboard. iii. Expert evaluation iv. Produce a final report. v. Review project

Conclusion

As a conclusion the small business has benefited from the research by analysing product sales data in its day-to-day operations. As a result, DMB may improve its company performance and compete with other retail stores on occasion. The CRISP-DM strategy is critical for precisely identifying the study's objective as well as fully presenting the project. It is a method of approaching a research problem methodically in order to generate a research work plan as a result. Instruction is given on how to select the processes, resources, scientific instruments, and methodologies that will produce the desired results while adhering to the framework. The dashboard will be created based on the analysing that will be done soon. As in a hole with is design business analysis, DMB may can improve its company performance and compete with other retail stores.

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DATA STRUCTURE UNIQUENESS IN PYTHON PROGRAMMING LANGUAGE

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ABSTRACT

Python is categorized as general-purpose language which means it can be applied to a variety of problems or not specialized to a specific area. Python is a powerful programming language which supports the creation of application systems, penetration of security testing and conduct complex data analysis on huge volume of data (data science). Hence, Python helps the programmer to develop the application faster because the syntaxes are almost like and simpler than C, C++ and Java programming languages. Among of the uniqueness of Python programming language is the implementation of its data structure. Data structures as implemented in the Python programming are easier to be organized or manipulated. Set, List, Tuple and Dictionary are among the most important built-in data structure in Python. These data structures have been simplified as compared to array and linked list data structures as used in C or C++. Each data structure in Python has its own strengths and characteristics in terms of mutable or immutable which means the ability to modify or change the value of data structure element's. Versatility of Python, make the Pythonistas are highly demanded amongst IT companies if they know better the usage of different kind of data structures in manipulating bulks of huge data to generate very valuable results.

Keywords: *python, list, set, tuple, dictionary*

Introduction & Literature Review

Python is a programming language which created by Guido van Rossum. It has been released in 1991 (w3School 2023). Generally, Python is used for web & software development, complex mathematical computations, system scripting, security system monitoring and data analysis. Python programming is popular because the strength of the libraries and simplicity of the commands as compared to Java, C++ or C language (Amos et all 2020). Another strength about Python is the data structures which can store and process high volume of data. Instead of manually transferring data from the Web or from spreadsheets, you can use Python to scrape bulks of data sources or spreadsheets in the time it takes you to do just once automatically.

Python is categorized as dynamic programming language because it supports varieties of programming paradigms such Imperative, Object-Oriented and Functional paradigms (Linner et all 2021). Similar to Java Programming, Python is executed in the Python interpreter to generate the Python byte code. The syntax of Python programming is very easy to learn because it's mimicking or like a

pseudocode. Hence, it helps the developer to construct the codes faster and minimize erroneous in the application program. The Python libraries are comprehensive because it also wrapped to C or C++ libraries to perform varieties of tasks and one of the major tasks is data analysis processing (data science). According to trends of peoples asked questions about programming problems through *StackOverflow* forum, figure 1 shows that questions on Python problems relatively exponentially increase through the years starting from 2009 as compared to other programming languages (Amos et all 2020).

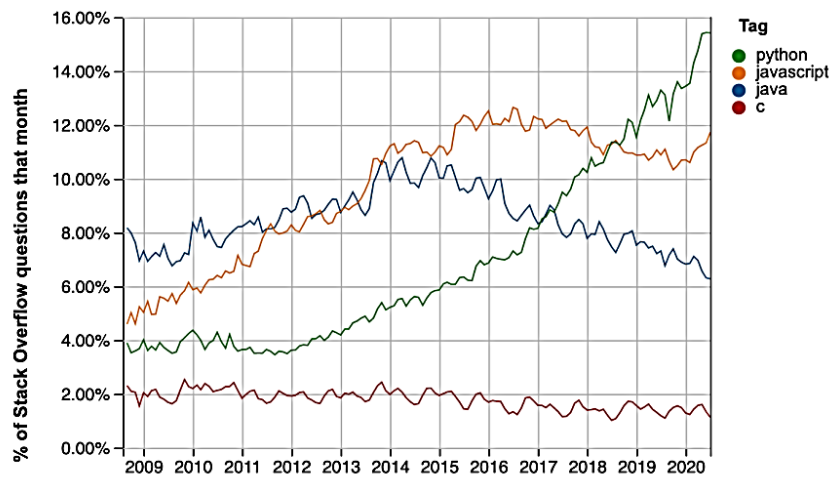


Figure 1: Frequencies of programming questions being asked at *StackOverflow* according to programming language types (Python, JavaScript, Java, C)

Similar survey has been conducted by *StackOverflow* to almost 1000 respondents asking on the popularity or preferability of the programming language as show in the figure 2. Its shows that the Python is topping in the chart.

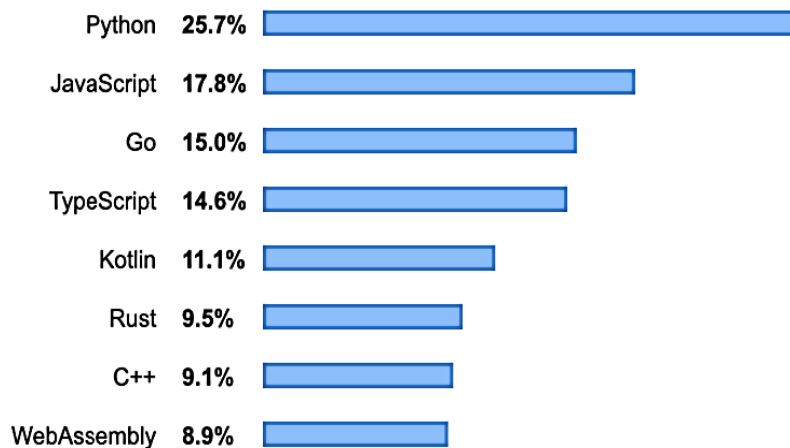


Figure 2: Survey on the popularity of programming languages amongst 1000 respondents

Special characteristic in Python is no variable declaration. This is similar to PHP, Scheme and PROLOG which all these programming languages are categorized as Dynamic typing. Type of variable will be determined during the execution (run time) of the codes. Unlike to C, C++ and Java, all variables must be declared before it can be used in the codes (Othman et al 2019). Python is unique because it's function able to return multiple variables. In contrast to return function in C, C++ or Java, the function can return single variable only, unless the programmer uses the void function to return multiples values by using the reference parameters passing as in C++, object parameter passing as in Java or pointer or array parameters passing as in C programming language (Zelle 2009).

Python has four (4) main non primitive data structures namely Lists, Tuple, Dictionary and Set. These data structures are easier to apply, managed, manipulated and stored as compared to Queue, Stack, Tree or Graph as implemented in C, C++ or Java programming language. Data Structures allows you to organize your data in such a way that enables you to store collections of data, relate them and perform operations on them accordingly. Lists, Tuple, Dictionary and Set are classified as linear data structures because elements of data structure are stored sequentially on the memory. Since the data are stored sequentially, it can be accessed or traversed through in a single execution (R20A0503, 2022). This article will elaborate more on the implementation of data structure such as List, Tuple, Dictionary and Set in Python programming language in the following section.

Comparison of Data Structure

Data structures allows you to manage, organize and store the data in such a way that enable you to perform certain operations or data manipulation (Edureka 2022). Generally, the data structures in Python can be divided into two (2) categories such as built-in and user-defined data structures. The built-in data structures in Python are list, tuple, dictionary and set. While the user-defined data structures are the queue, stack, tree, graph, linked lists and HashMaps. This article will focus discussions on the built-in data structures only.

i) Lists

Lists are the common data structures which applied by the most of python programmers to store either temporary or static data. Lists are similar with the implementation of array in C or C++ programming languages. But one of the special features of the list data structure in Python is, it enables us to store different data types in sequential order. The index value of the list starts with index 0 travelling from the first (front) element until the last (back) element of the list. But if we start from the last element of the list, it will be started with index -1 and the index value decremented travelling the list until the first (front) element of the list. The following are example of lists implementation in Python programming language. The symbol for list is '['].

Example 1.1

Example of lists which stores the same data types.

#nameList stores the string data type

```
>>> nameList = ["ALI", "ABU", "IBRAHIM", "BAKAR", "ZAMRI", "JUSOH", "AMINAH"]
>>> nameList
['ALI', 'ABU', 'IBRAHIM', 'BAKAR', 'ZAMRI', 'JUSOH', 'AMINAH']
```

#marksList stores the integer data type

```
>>> marksList = [67, 82, 61, 70, 68, 80, 77]
>>> marksList
[67, 82, 61, 70, 68, 80, 77]
```

#GPAList stores the float data type

```
>>> GPAList = [3.00, 4.00, 2.67, 3.33, 3.00, 4.00, 3.67]
>>> GPAList
[3.0, 4.0, 2.67, 3.33, 3.0, 4.0, 3.67]
```

Example 1.2

Example of methods to retrieve elements from the list.

#Original list

```
>>> listName = ["ALI", "ABU", "IBRAHIM", "BAKAR", "ZAMRI", "JUSOH", "AMINAH"]
```

#to retrieve element from the list at index 1

```
>>> listName[1]
'ABU'
```

#to retrieve elements from the list at index 0 until 1, index 2 is excluded

```
>>> listName[0:2]
['ALI', 'ABU']
```

#to retrieve the first three elements from the list

```
>>> listName[:3]
['ALI', 'ABU', 'IBRAHIM']
```

#to retrieve the last element from the list

```
>>> listName[-1]
'AMINAH'
```

#to retrieve the last three elements from the list

```
>>> listName[-3:]
['ZAMRI', 'JUSOH', 'AMINAH']
```

Example 1.3

Example of list which stores different data types in the same list.

#the studentList stores different data types. Starts with string and followed by integer and float.

```
>>> studentList = ["ALI", 67, 3.00]
>>> studentList
['ALI', 67, 3.0]
```

Example 1.4

Examples of commands or instructions in Python programming to manipulate elements in the list.

```
#to append new element in the list, the new element will be appended at the last index
>>> nameList.append("KALISHAH")
>>> nameList
['ALI', 'ABU', 'IBRAHIM', 'BAKAR', 'ZAMRI', 'JUSOH', 'AMINAH', 'KALISHAH']
#to remove the value from the list
>>> nameList.remove("BAKAR")
>>> nameList
['ALI', 'ABU', 'IBRAHIM', 'ZAMRI', 'JUSOH', 'AMINAH', 'KALISHAH']
```

Example 1.5

Example of Python code to process the data stored in the list.

```
def main():
    marksList = [67,82,61,70,68,80,77]
    sumMarks = 0

    for x in range(len(marksList)):
        sumMarks = sumMarks + marksList[x]

    average = sumMarks/len(marksList)

    print("The average mark is {0:0.2f}".format(average))
main()
```

Output:

The average mark is 72.14

ii) *Tuples*

Tuples are similar as lists but the only different is the elements of the tuple cannot be changed or updated. The term used is immutable. List is mutable. Tuple allows you stores different data types or you may store the same data type in the tuple. Parenthesis ‘()’ is used to create the tuple.

Example 2.1

Example of assigning the values in a tuple.

```
>>> numberTuple = (1,2,3,4,5,6,7,8,9,10)
>>> numberTuple
(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
```

Example 2.2

To retrieve the elements from the tuple.

```
#to retrieve element from the tuple at index 2
>>> nameTuple[2]
3

#to retrieve elements from the tuple at index 3 until 4, index 5 is excluded
>>> nameTuple[2:5]
(3, 4)

#to retrieve the last four elements from the tuple
>>> print(nameTuple[-4:])
(1, 2, 3, 4)
```

Example 2.3

To add new elements in the tuple.

```
#Two numbers added in the tuple
>>> numberTuple = numberTuple + (11,12)
>>> numberTuple
(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12)
```

Example 2.4

Implementation of code Python using tuple.

```
def main():

    numberTuple = (1,2,3,4,5,6,7,8,9,10)
    cntOdd=0
    cntEven=0

    for x in range(0,10,1):
        if (numberTuple[x] % 2 == 0):
            cntEven=cntEven+1
        else:
            cntOdd=cntOdd+1

    print("Number of odd numbers found: ",cntOdd)
    print("Number of even numbers found: ",cntEven)

main()
```

Output:

```
Number of odd numbers found: 5
Number of even numbers found: 5
```

iii) *Dictionaries*

Dictionaries data structure in Python consists of two components which are the keys and values. The values in dictionaries are mutable, which the value can be updated. The symbol used for dictionary is the curly bracket ‘{}’ and colon ‘:’ to separate the key on the left and values on the right of the dictionary elements.

Example 3.1

Example of assigning the values in a dictionary.

```
#the elements of dictionary consists of key and value
>>> dicStudent = {1001:"ALI",1002:"ABU",1003:"BAKAR",1004:"MAN",1005:"BAKRI"}
>>> dicStudent
{1001: 'ALI', 1002: 'ABU', 1003: 'BAKAR', 1004: 'MAN', 1005: 'BAKRI'}
```

Example 3.2

To access or retrieve value from the dictionary by using the key of dictionary.

```
#access the value by using the key number but not the index number as
implemented in list or tuple
>>> print(dicStudent[1003])
```

BAKAR

```
>>> for x in dicStudent:
    print(dicStudent[x], end=" ")
```

Output:

```
ALI ABU BAKAR OSMAN BAKRI
```

Example 3.3

To manipulate (update, insert or remove) values from the dictionary.

```
#to update the value of 'BAKAR' to 'ZAMRI' by using the key '1003'
>>> dicStudent[1003] = "ZAMRI"
>>> dicStudent
{1001: 'ALI', 1002: 'ABU', 1003: 'ZAMRI', 1004: 'OSMAN', 1005: 'BAKAR'}
```

```
#to remove the value of 'ZAMRI' from dictionary by using the key '1003'
>>> del dicStudent[1003]
>>> dicStudent
{1001: 'ALI', 1002: 'ABU', 1004: 'OSMAN', 1005: 'BAKAR'}
```

```
#to insert or add new element in the dictionary by using the new key
>>> dicStudent[1003]="JUSOH"
>>> dicStudent
{1001: 'ALI', 1002: 'ABU', 1004: 'OSMAN', 1005: 'BAKAR', 1003: 'JUSOH'}
```

iv) *Sets*

Set is a collection of unordered data that is unique or other word the data is not duplicated each other. In Python, all data in a set will be enclosed or inside of the symbol '{ }' or curly bracket. Set does not support the indexing to retrieve the elements or data from the set data structure.

Example 4.1

Example of assigning the values in a set. A set allows to store the same or different data types and this is similar to list or tuple.

```
#assigning numbers to setA and setB
>>> setA = {2,4,6,8}
>>> setB = {1,3,5,7}
>>> setA
{8, 2, 4, 6}
>>> setB
{1, 3, 5, 7}
```

```
#assigning numbers and characters in the setC
>>> setC = {1,'a',2,'b',3,'c',4,'d'}
>>> setC
{1, 2, 3, 4, 'a', 'd', 'b', 'c'}
```

Example 4.2

To manipulate (update, insert or remove) values from the set.

```
#to insert or add new value in the setA
>>> setA.add(10)
```



```
>>> setA
{2, 4, 6, 8, 10}

#to insert values in the setA, the inserted new values will be organized
in ascending order
>>> setA
{2, 4, 6, 8, 10}
>>> setB
{1, 3, 5, 7}
>>> setA.update(setB)
>>> setA
{1, 2, 3, 4, 5, 6, 7, 8, 10} #data is organized in ascending order

#to remove an existing value from the setA
>>> setA.discard(3)
>>> setA
{1, 2, 4, 5, 6, 7, 8, 10} #3 is removed from the original setA
```

Example 4.3

Implementation of set using Python programming language.

```
def main():
    setMarks = {45,78,90,42,78}

    cntFail=0
    for i in setMarks:
        if (i < 50):
            cntFail=cntFail + 1
    print("Total student fail : ",cntFail)

main()
```

Output:

```
Total student fail : 2
```

Example 4.4

Set data structures supports the operations of union (|) and intersection (&) between the sets.

```
>>> setA = {1,2,4,6,7}
>>> setB = {2,7,4,9,3}

>>> setA | setB          #symbol for union is |
{1, 2, 3, 4, 6, 7, 9}
>>> setA.union(setB)    #the method union() can be used
{1, 2, 3, 4, 6, 7, 9}

>>> setA & setB         #symbol for intersection is &
{2, 4, 7}
>>> setA.intersection(setB) #the method intersection() can be used
{2, 4, 7}
```

Conclusion

Based on the detail examples as given for the four (4) different built-in data structures in Python, we conclude that the list, dictionary and set are mutable, while tuple is immutable. The indexing in the set is not applicable as compared to the other 3 built-in data structures. Set has special features of combining

or differentiating the sets by using the union, intersection or difference methods. Through these brief explanation on data structures uniqueness in Python, the readers are expected to gain basic understanding and exposure on how to implement the appropriate data structure for any problem statements.

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BERSEMUKA atau ATAS TALIAN?

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ABSTRAK

Sejak pandemik Covid-19 melanda dunia pada penghujung tahun 2019, kehidupan manusia secara amnya telah banyak berubah daripada kebiasaan. Bidang pendidikan juga tidak terkecuali daripada mengalami perubahan yang agak drastik kesan daripada pandemik ini. Susulan daripada itu, pelbagai kaedah pembelajaran atas talian atau "online distance learning" telah dilaksanakan untuk memenuhi keperluan pengajaran dan pembelajaran. Perubahan kaedah daripada tradisional kepada penggunaan teknologi ini pasti mempunyai kesan kepada para pelajar terutama di institusi pengajian tinggi. Lantaran itu, satu tinjauan kuantitatif yang menggunakan soal selidik ringkas dijalankan untuk meninjau pandangan dan pilihan responden antara pembelajaran bersemuka atau secara atas talian. Sampel yang digunakan adalah para pelajar semester Oktober 2022-Februari 2023 yang mengambil subjek MAT565 dan STA408 di UiTM Cawangan Pulau Pinang (UiTM CPP). Selepas pengumpulan data, tinjauan ini mendapati 79.6% daripada sejumlah 118 responden memilih kelas secara bersemuka berbanding secara atas talian kerana ia lebih berfaedah, menyeronokkan dan meriah.

Keywords: *pembelajaran atas talian, pembelajaran bersemuka, "online distance learning"*

Pengenalan

Penghujung tahun 2019, dunia telah digemparkan dengan kemunculan wabak baru yang dikenali sebagai Covid-19. Sejak itu, beberapa perintah kawalan pergerakan (PKP) dengan prosedur operasi standard (SOP) tertentu telah dilaksanakan bukan sahaja di Malaysia, malah di seluruh dunia. Ia bertujuan mengekang daripada wabak terus tersebar yang boleh mengakibatkan kematian yang tragis buat umat manusia. Kemunculan Covid-19 yang tidak dijangka ini, sekaligus merubah corak pengajaran dan pembelajaran yang selama ini berpaksikan kaedah tradisional iaitu secara bersemuka. Dengan adanya sekatan semasa PKP, semua institusi pengajian sama ada rendah, menengah dan universiti telah ditutup sepenuhnya.

Maka, pembelajaran atas talian telah menjadi norma baharu dalam kalangan semua pelajar termasuk di universiti. Bermula dengan pengajaran dan pembelajaran atas talian ini, para pelajar dan tenaga pengajar juga perlu mengubah cara pembelajaran dan penyampaian masing-masing. Pada peringkat permulaan ia dilaksanakan, terdapat beberapa kekangan dan kerisauan yang perlu dihadapi. Di antaranya ialah kandungan pembelajaran yang terhad dan tidak menarik, serta kesediaan dan kesedaran para pelajar terhadap sistem pembelajaran berpaksikan teknologi digital (Hafiza, 2020), capaian internet yang rendah, had dan kelajuan data yang agak lambat, dan lokasi yang berada jauh

daripada kawasan bandar (Muthuprasad et al., 2021). Begitu juga dengan kebimbangan terhadap penyalahgunaan aplikasi digital yang mudah diakses seperti yang dinyatakan oleh Nor Hanim, Rafizah dan Noor Aina (2021).

Namun begitu, setelah hampir tiga tahun menjalani dan mengikuti pembelajaran secara atas talian, pada penghujung 2022, Universiti Teknologi MARA (UiTM) akhirnya memberi ruang untuk pengajaran dan pembelajaran diadakan dalam dua medium, bersemuka dan ODL. Perkara ini tentu dilihat sebagai sesuatu yang amat baik buat semua pihak. Namun, timbul pula tanda tanya, yang manakah sebenarnya menjadi pilihan buat para pelajar terutamanya di institusi pengajian tinggi awam atau pun swasta. Hasil tinjauan yang dilakukan oleh Abdul Aziz dan Aida Zuraina (2020) mendapati bahawa kesediaan para pelajar untuk pembelajaran atas talian berada pada tahap yang sederhana, manakala hubungan antara motivasi pelajar dan pembelajaran atas talian adalah sangat signifikan. Namun begitu, ia masih perlu diberi tumpuan kerana mungkin wujudnya beberapa faktor yang boleh merencatkan proses pembelajaran yang dilaksanakan.

Kajian yang dilaksanakan oleh Gherhes et al (2021) mendapati dalam kalangan responden mereka, para pelajar lebih berminat untuk menjalani pembelajaran secara bersemuka berbanding dengan atas talian. Malahan, lebih separuh daripada responden menyatakan bahawa mereka mahu kembali kepada format pengajaran traditional apabila wabak Covid-19 telah berakhir. Sementara itu, beberapa kajian yang dijalankan oleh penyelidik-penyelidik menunjukkan keputusan yang sama iaitu persepsi para pelajar terhadap pembelajaran atas talian berada pada tahap sederhana (Mohd Noor, Rosni & Kamal Azmi, 2021; Nur Akalili & Nurfaradilla, 2021; Anisah Bahyah, Azu Farhana & Mariati, 2022). Juwairiah dan Roslinda (2021) yang memfokuskan terhadap pelajaran matematik mendapati bahawa kebanyakan respondennya mempunyai tahap kepuasan yang tinggi terhadap pembelajaran atas talian untuk subjek ini dengan sebilangan kecil sahaja mempunyai tahap kepuasan yang rendah.

Begitu juga keputusan yang diperolehi oleh Rozelia Haizah dan Nur Farakhanna (2022), di mana tahap kesediaan pelajar terhadap pembelajaran atas talian adalah tinggi. Dalam pada itu, tinjauan oleh Ainul Nadzifah et al. (2022) terhadap subjek pengajian Islam menunjukkan motivasi pelajar berada pada tahap yang rendah apabila menjalani pembelajaran atas talian. Selaras dengan ini, menurut kajian yang dijalankan oleh Siti Balqis dan Maisurah (2021), pencapaian pelajar yang disoal selidik tidak dipengaruhi oleh kaedah pembelajaran secara bersemuka atau atas talian. Walaupun para pelajar dapat mengadaptasi kepada susana baru, terdapat juga beberapa kekangan yang perlu dihadapi apabila sistem pembelajaran secara traditional berubah kepada pembelajaran atas talian (Aimi Shatirah & Nur Faradilla, 2022).

Berdasarkan kajian-kajian yang telah dinyatakan, maka kajian awal ini dilaksanakan untuk meninjau pandangan dan pilihan responden terhadap pembelajaran atas talian dan secara bersemuka.

Metodologi

Kajian awal yang dijalankan ini melibatkan 118 pelajar Kolej Kejuruteraan UITM CPP yang mengambil subjek *Advanced Differential Equations* (MAT565) dan *Statistics for Science and Engineering* (STA408) pada semester Oktober 2022-Februari 2023. Bagi subjek MAT565, jam temu kuliah dan tutorial adalah secara bersemuka, manakala bagi STA408, dua jam kuliah secara atas talian, dan sejam kuliah serta tutorial secara bersemuka. Kesemua para pelajar ini melalui proses pengajaran dan pembelajaran atas talian secara penuh pada semester Mac-Julai 2022. Analisa deskriptif dijalankan terhadap keputusan soal selidik yang diedarkan menggunakan *Google form* kepada setiap pelajar yang terlibat.

Analisa dan Perbincangan

Keputusan analisa soal selidik yang dijalankan menunjukkan bahawa jumlah responden lelaki 35.2% lebih banyak daripada jumlah responden perempuan. Secara totalnya, 80 responden ialah lelaki (67.8%) dan 38 responden ialah perempuan (32.2%). Jadual 1 menunjukkan kekerapan dan peratusan responden dalam kajian.

Jadual 1: Kekerapan dan peratusan responden mengikut jantina

Jantina	Kekerapan	Peratusan %
Lelaki	80	67.8
Perempuan	38	32.2
	118	100%

Berdasarkan Jadual 2, majoriti responden yang mengambil bahagian dalam menjawab soal selidik adalah daripada Fakulti Kejuruteraan Elektrik iaitu 49 orang atau 41.5%. Pelajar daripada Fakulti Kejuruteraan Awam adalah sebanyak 40 orang atau 33.9%, Fakulti Kejuruteraan Mekanikal sebanyak 17 orang (14.4%) dan hanya 12 pelajar (10.2%) daripada Fakulti Kejuruteraan Kimia.

Jadual 2: Kekerapan dan peratusan responden mengikut fakulti

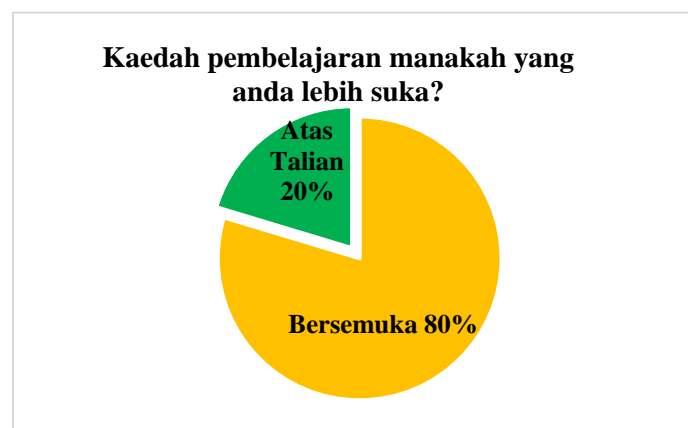
Fakulti	Kekerapan	Peratusan %
PKA	40	33.9
PKM	17	14.4
PKE	49	41.5
PKK	12	10.2
	118	100%

Jadual 3 menunjukkan kekerapan dan peratusan responden mengikut subjek. 75.4% (89 pelajar) adalah pelajar yang mengambil subjek statistik, manakala selebihnya (24.6%) mengambil subjek matematik.

Jadual 3: Kekerapan dan peratusan responden mengikut subjek

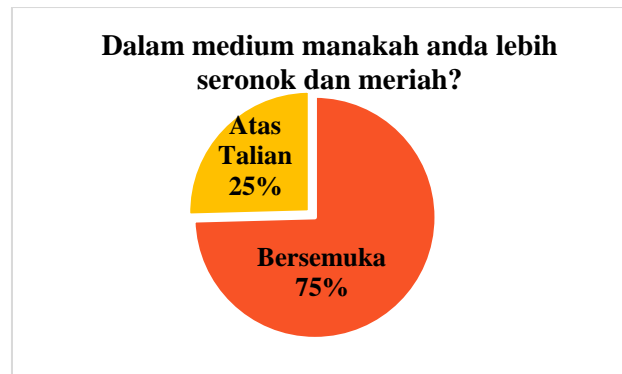
Subjek	Kekerapan	Peratusan %
Matematik	29	24.6
Statistik	89	75.4
	118	100%

Rajah 1 menunjukkan keputusan pilihan kaedah pembelajaran yang lebih digemari oleh pelajar. Pelajar ditanya sama ada mereka lebih menggemari kaedah pembelajaran secara atas talian atau kaedah pembelajaran secara bersemuka di dalam bilik kuliah. Berdasarkan analisis kajian, 80% daripada mereka lebih menggemari kaedah pembelajaran secara bersemuka berbanding pembelajaran secara atas talian. Sebanyak 20% pelajar lebih menggemari kaedah pembelajaran secara atas talian berbanding pembelajaran secara bersemuka.



Rajah 1: Kaedah pembelajaran pilihan pelajar

Bagi soalan “Dalam medium manakah anda rasa lebih seronok dan meriah untuk belajar?”, Rajah 2 menunjukkan majoriti (75%) pelajar memilih medium bersemuka lebih seronok dan meriah berbanding medium atas talian (25%). Hal ini mungkin disebabkan oleh masalah capaian internet, peluang untuk berkomunikasi, tahap motivasi dan suasana belajar yang kurang memberansangkan seperti yang dilaporkan oleh Aimi Shatirah dan Nurfaradilla (2022).



Rajah 2: Medium yang menyeronokan dan meriah untuk belajar.

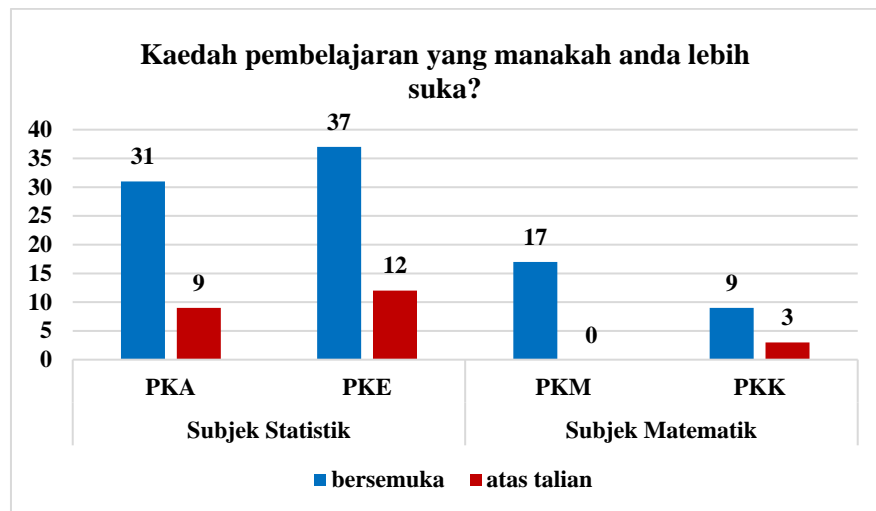
Rajah 3 pula memaparkan keputusan bagi soalan “Kaedah pembelajaran manakah yang lebih berfaedah untuk anda?”. Berdasarkan analisa di bawah, 74% peratus daripada responden memilih kaedah pembelajaran secara bersemuka lebih berfaedah untuk diri mereka berbanding pembelajaran secara atas talian. Hal ini menyokong dapatan oleh Gherhes et al (2021) yang disebut sebelum ini.



Rajah 3: Kaedah pembelajaran yang lebih berfaedah.

Rajah 4 menunjukkan kaedah pembelajaran yang menjadi pilihan pelajar mengikut fakulti dan subjek. Berdasarkan analisis kajian untuk subjek MAT565, didapati semua pelajar daripada Fakulti Kejuruteraan Mekanikal memilih kaedah pembelajaran secara bersemuka. Hal ini menjadikan tiada pelajar yang menggemari kaedah pembelajaran secara atas talian. Hasil kajian juga menunjukkan bahawa hanya tiga orang pelajar daripada Fakulti Kejuruteraan Kimia memilih kaedah pembelajaran atas talian. Selain itu, berdasarkan analisis kajian untuk subjek STA408, majoriti pelajar daripada Fakulti Kejuruteraan Elektrik dan Fakulti Kejuruteraan Awam memilih kaedah pembelajaran secara bersemuka berbanding pembelajaran secara atas talian. Seramai 31 orang pelajar Fakulti Kejuruteraan Awam memilih pembelajaran secara bersemuka, manakala 9 orang lagi lebih menggemari pembelajaran secara atas talian. Tren yang sama boleh dilihat pada pelajar Fakulti Kejuruteraan Elektrik di mana 37

orang pelajar fakulti tersebut lebih menggemari pembelajaran secara bersemuka berbanding pembelajaran atas talian.



Rajah 4: Kaedah pembelajaran yang disukai pelajar mengikut subjek dan fakulti.

Kesimpulan

Kajian ini dilaksanakan untuk meninjau pandangan dan pilihan pelajar-pelajar kejuruteraan yang mengambil subjek MAT565 dan STA408. Secara keseluruhannya, tinjauan ini membuktikan bahawa majoriti para pelajar yang terlibat dalam soal selidik memilih untuk belajar secara bersemuka berbanding dengan atas talian. Mereka juga berpendapat, pembelajaran bersemuka adalah lebih menyeronokkan dan meriah serta lebih berfaedah. Pada masa hadapan, kajian ini akan dilanjutkan untuk mengetahui sebab-sebab mereka memilih untuk belajar secara bersemuka dan atas talian.

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PERSUASIVE E-LEARNING PORTAL FOR ARABIC LANGUAGE: ArabKafa3

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ABSTRACT

The Al-Quran and Fardu Ain Class Program (KAFA) has been in place since 1990 with the goal of strengthening the foundations of Islamic education for children aged 7 to 12. The approach stresses reading the Al-Quran with tajwid and strengthening Fardu Ain's principles among his students, including knowledge of Arabic and writing Jawi. If students are not fluent in Jawi, they will have difficulty reading and understanding Arabic. In the context of teaching and learning Arabic, students are found to be less interested in learning and mastering the language. In this pandemic era, learning portals are quickly becoming one of the most popular learning tools. Technology was designed to help students learn, but there are times when the technology highlighted is not focused on achieving an objective and is not specifically designed, causing students to become disoriented. Students nowadays frequently face attitudinal issues such as difficulty focusing in purely online situations, boredom, isolation, and a lack of self-regulation. Recognizing the problem and the positive impact of persuasive technology in education, an Arabic language e-learning portal (ArabKafa3) will be developed through the adaptation of persuasive technology involving the principles of tunneling, liking, self-monitoring and cooperation. The ArabKafa3 scope focuses on several topics related to the Arabic language syllabus for third-year KAFA students. The ADDIE Model methodology is used to develop ArabKafa3, and the interface design of the ArabKafa3 based on persuasive technology principles is discussed in this study.

Keywords: *Persuasive Technology, KAFA, Arabic, ADDIE Model, interface design*

Introduction

The Al-Quran and Fardu Ain Class Program (KAFA) has been in place since 1990 with the goal of strengthening the foundations of Islamic education for children aged 7 to 12. The approach stresses reading the Al-Quran with tajwid and instilling Fardu Ain's principles in his students, such as Arabic knowledge and writing Jawi. KAFA Primary School is the first medium for developing a generation of Arabic language masters. However, learning in KAFA schools differs significantly from learning in government-aided daily primary schools due to insufficient infrastructure, a short period of time, and some of the teachers being graduates of modest academic education (Ros et al. 2022). The factor of student understanding at the KAFA level is determined by the teacher's instruction and the measures taught. The process of learning Arabic for students begins with understanding the Arabic words, and

then the teacher translates those words into Malay so that the students can easily understand the wishes or instructions of the training questions. The success of the teacher is determined by the learning process of the students' reactions as well as their interaction in the lesson. Students who are not fluent in Jawi will struggle to read and understand Arabic.

According to a previous study, students believe they have low self-confidence and motivation, and they are also skeptical of their ability to master Arabic because Arabic is a difficult language (Kassim et al. 2017). One of the major issues in teaching and learning Arabic is students' passive attitude (Lubis et al. 2014). As a result, in order to achieve a high level of language proficiency, students should adopt an attitude consistent with their interests, such as reading Arabic language materials, listening to Arabic conversations, searching for information in Arabic via internet resources, and not missing out on communicating with those who can speak Arabic in class, outside of class, and so on (Mustafa & Mohamad 2014).

According to current events, the world has been shocked by the emergence of the dangerous covid-19 virus, which has killed many people from all over the world and is still prevalent. This has resulted in the paralysis of various systems such as the economy, security, and education. Because students from various primary, secondary, and higher levels are unable to continue learning face-to-face, the education system is severely impacted. Through the online learning system, technology plays an important role in empowering the use of technology. Learning portals are quickly becoming one of the most popular learning tools in this pandemic era. Technology was created to assist students in learning, but there are times when the technology highlighted is not focused on achieving a specific goal and is not specifically designed, causing students to become disoriented. Nowadays, students frequently experience attitudinal issues such as difficulty focusing in purely online situations, boredom, isolation, and a lack of self-regulation.

Technology can be used as persuasive tools to persuade students to learn in an enjoyable manner. Persuasive technology (PT) refers to technologies that aim to change an individual's behaviour through persuasion and social influence (Caraben et al. 2014). Persuasive technology can be defined as technology that is designed to change the attitudes or behavior of users in a predetermined way. Aside from motivation and persuasion, strategy is the most important component of PT architecture (Oinas-Kukkonen 2013; Oinas-Kukkonen & Harjumaa 2018). To design a system based on PT architecture, the persuasive technique or strategy to motivate behavioral changes should be carefully considered. According to the findings of Nor Aziah et al. (2017), the Persuasive System Design (PSD) designed by Oinas-Kukkonen & Harjumaa (2018) is a comprehensive framework for planning and evaluating the PT. Despite this, Nor Aziah et al. (2017) discovered that the majority of Malaysian researchers did not use the PSD as a reference or guide to adapt the persuasive principles in their research. As a result, researchers must investigate and scrutinise the PSD.

The PSD model proposed by Oinas-Kukkonen (2018) consists of four design principles that should be considered when developing a prototype or application. The four categories are primary task support, dialogue support, system credibility support, and social support. The primary tasks support focusing on what the primary tasks should be. Dialogue support refers to computer-human dialogue that aids in the achievement of goals. The system credibility support category discusses how to design a system so that it is more realistic and persuasive. The social support category describes how to design the system so that it motivates users by leveraging social influence.

There is a total of 28 principles of PSD as explained by Oinas-Kukkonen & Harjumaa (2018). Not all PSD principles will be applied in this research domain. Recognizing the problem and the positive impact of persuasive technology in education, an Arabic language e-learning portal (ArabKafa3) will be developed through the adaptation of persuasive technology involving the principles of tunneling from primary task support category, liking and self-monitoring from dialogue support category as well as cooperation from social support category as shown in Table 1.

Table 1: Persuasive Technology Principles Adapted in ArabKafa3

Requirement	Description	Category	Persuasive Technology Principles
An e-learning portal should guide students in the process of changing their attitudes by favourably impact for action that bring them closer to the desired behaviour.	Using the ArabKafa3 to guide students through a process or experience provides opportunities to persuade along the way.	Primary Task Support	Tunneling
An e-learning portal should have a look and feel that appeals to students.	ArabKafa3 is visually attractive for students is likely to be more persuasive	Dialogue Support	Liking
An e-learning portal should provide means for students to track their performance or status.	ArabKafa3 monitors one's own performance or status and assists the student in reaching goals.	Dialogue Support	Self-monitoring
An e-learning should provide means for cooperation.	ArabKafa3 can persuade students to adopt a desired attitude or behaviour by leveraging people's natural desire to cooperate.	Social Support	Cooperation

ArabKafa3 can help students learn Arabic because the characters appear with colours, text, images, sounds, animations and movies. In addition, the inclusion of Wordwall, a web application with interesting educational and interactive quiz-based games, will increase children's interest in ArabKafa3. ArabKafa3 is developed using the ADDIE Model methodology, and the interface design of ArabKafa3 based on persuasive technology principles is discussed in this study.

Methodology

ArabKafa3's development is based on the ADDIE model. The method is used to define the progress required to complete the project by modifying the ADDIE model's five phases. The phases are as follows: analysis, design, development, implementation, and finally development. These five stages demonstrate dynamic, adaptable instruction in the development of effective training and performance support tools. This study focuses on the design phase, which involves interface design. In this phase, the adaptation of persuasive principles is used to describe how content material is navigated page by page, as well as the multimedia elements required on each page.

Figure 1 depicts the first page of ArabKafa3. To proceed to the next page, the user must click the "Start" button. On this page, animation and large-size text are used to draw the user's attention, and the features are related to the liking principle.



Figure 1: The First Page of ArabKafa3

Figure 2 depicts the ArabKafa3 main menu, which is divided into three selected topics: "My Beautiful Clothes", "Colors", and "Weekdays". The tunnelling and cooperation principles were used in this interface design. The adaptation of the tunnelling principle that specializes in learning topic by topic improves students' ability to focus learning on a topic without becoming disoriented. When students are at ease, they are more likely to cooperate, which can persuade them to learn in a more enjoyable manner.



Figure 2: ArabKafa3 Main Menu

Figure 3 depicts the "My Beautiful Clothes" page, which includes Note, Video, Quiz, and Game buttons that correspond to their respective pages. The home button navigates to the homepage, while the "X" button exits the portal. Users chose the icon to reduce memory capacity. The principles of liking and tunnelling apply to this interface design.



Figure 3: My Beautiful Clothes Page

Figure 4 depicts the Notes page for "My Beautiful Clothes" topic which will include text, images, sound, animation, and video. Students like the idea of simple notes with visual elements that can help them understand better. This scenario demonstrates the application of the liking principle. The button ">" takes users to the next alphabet number, while the button "<" does the opposite. The arrow icons indicate whether the user wants to move on to the next note or return to the previous one.



Figure 4: Note Page: My Beautiful Clothes

Figure 5 depicts the Video page for “My Beautiful Clothes” topic. There will be a description box for the students to understand what they are watching. Video is a combination of the most dynamic and realistic multimedia elements that can influence student motivation towards the process of accepting a learning process in an enjoyable manner. In this case, the principle of liking is used to acknowledge students' preferred learning method.



Figure 5: Video Page: My Beautiful Clothes

There will be an exercise in the form of multiple-choice question (MCQ) and match question in the Quiz Page. English-Arabic is being used as a medium to answer the exercise. The score obtained from quiz activities allows students to self-assess their level of mastery for each topic. In this case, the interface design incorporates the self-monitoring principle. Figure 6 depicts one of the quiz page's self-monitoring activities for “My Beautiful Clothes” topic.



Figure 6: Quiz Page: My Beautiful Clothes

Games are used to help students enjoy using ArabKafa3. Figure 7 depicts anagram activity, which is available on the Game page for “My Beautiful Clothes” topic. Students must arrange the letters to form the correct word. This user interface design incorporates the principles of liking and cooperation to raise the bar for learning each topic's core concepts and ideas.



Figure 7: Game Page: My Beautiful Clothes

Conclusion

Adapting persuasive technology in the development of ArabKafa3 E-Learning portal is very helpful because students' emotional levels vary depending on course, age, and maturity. The development of ArabKafa3 is one of the stepping stones to incorporating persuasive technology as one of the important

elements in today's educational environment. ArabicKafa3 E-Learning portal adapted tunnelling, liking, self-monitoring, and cooperation principles can have a positive impact on developing students' KAFA discipline towards Arabic class session.

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THE EXISTENCE OF AUGMENTED REALITY TECHNOLOGY IN VIDEO GAMES

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ABSTRACT

Augmented Reality (AR) is a technologically augmented representation of the recreated by using digital visual elements, music, or other sensory stimulation. However, the expenses of making an AR are so high. AR can make people's lives easier by introducing virtual information. It can also enhance the user's missing senses through sensory substitution. Games with greater augmented reality capabilities may create worlds that change based on the user's location. AR may display real-time data from items and allow people to operate them via mobile devices. Touchscreen, voice, or gesture are all options. AR might potentially reveal real-time data coming from items. Pokémon Go and Minecraft Earth are examples of games that have AR elements. Next, AR can increase the knowledge and understanding of users. On the other side, AR can give a negative impact on users. For instance, the tendency in increasing the user's screen time. One of the differences between AR and VR is their visibility. Augmented Reality has great promise and almost unlimited capabilities. The use of augmented reality has the ability to alter the design dynamic. This paper will discuss the implementation of AR in the gaming industry.

Keywords: *Augmented Reality, Pokémon Go, Minecraft Earth, Implementation, Gaming Industry*

Introduction

Augmented reality (AR) is a technologically augmented representation of the recreated by using digital visual elements, music, or other sensory stimulation (Hayes, 2022). Augmented reality has progressed from a science-fiction concept to a scientific reality. Until recently, the expenses of augmented reality were so high that designers could only dream of working on design projects that included it. However, times have changed and augmented reality is now available on mobile handsets. In 1957, a cameraman named Morton Heilig found some success with augmented reality. He created the Sensorama, which provided the spectator with images, audio, vibration, and scent. Louis Rosenberg's AR system, built at USAF Armstrong's Research Lab in 1992, was most likely the first fully functional AR system. This was known as Virtual Fixtures, and it was an extremely complex robotic system developed to compensate for the early 1990s' lack of high-speed 3D graphics processing capacity. It allowed for the overlay of sensory information on a workspace in order to boost human productivity (Augmented Reality - The Past, The Present and The Future, 2020).

Augmented reality is created using a range of technological breakthroughs, which can be used alone or in combination to create augmented reality. Augmented Reality seeks to make the user's life

easier by introducing virtual information not just to his immediate surroundings, but also to any indirect view of the real-world environment, such as a live-video feed. AR has the ability to augment all senses, including smell, touch, and hearing. AR can also be used to enhance or substitute users' missing senses through sensory substitution, such as supplementing the sight of blind or low-vision users with audio cues or augmenting hearing for deaf users with visual cues.

Augmented reality begins with a camera-equipped device loaded with AR software, such as a smartphone, tablet, or smart glasses. When a user aims the gadget at an object, the program recognizes it by analyzing the video stream using computer vision technologies. AR may display real-time data from products and let users operate them via touchscreen, voice, or gesture. A user, for example, might touch a stop button on a digital graphic overlay within an AR experience or just say the word "stop" to send a command to a product over the cloud. An operator interacting with an industrial robot using an AR headset may see overlay data on the robot's performance and have access to its controls.

The cost of making an AR application may vary depending on the complexity and specialist rate in every country. For example, a simple AR application will cost at least \$7000-\$50000 meanwhile the most complex application will take at least \$250000. For the specialist rate, they will charge per hour. For instance, specialists from the USA or Canada will charge \$100 to \$250 per hour but in Asia, they will charge cheaper, which is \$55 per hour. AR app development is utilized in the game industry to build a playing zone within an existing artificial environment. When played on smartphones, tablets, or gaming systems, this technology is known to overwhelm people. The yellow-colored "first down" line that emerged in a football game in 1998 was the first commercial deployment of AR technology (Summer, 2023).

Implementation of AR in Gaming Industry

The term "augmented reality" refers to a display environment that is based on the real world and leverages the capabilities of a computer or smartphone to offer the user a display, sound, text, and effects that enhance their experience of the real world. After the introduction of virtual reality in the real world, augmented reality (AR) emerged as a creative and immersive experience that enables users to feel happy after interacting personally with the digital environment. This was made possible by Augmented Reality's ability to immerse users in the experience. In the game business, augmented reality is used to create play zones within artificial landscapes that already exist to dominate people when it is played on mobile devices such as smartphones, tablets, and game consoles. Since the development of interactive experiences of real-world surroundings, in which every real-world object has been added, this technology has had a huge impact on the gaming business.

Augmented reality also refers to the practice of simulating artificial elements inside a real environment. The user's perspective of the real world is supplemented with computer-generated pictures using 3D graphics, which are superimposed on top of the user's view of the real world. This is feasible

due to the fact that computers employ sensors and algorithms to ascertain the orientation of a camera. The world is not unfamiliar with the concept of 3D film viewing. Due to the outrageous cost, it has not acquired the targeted degree of public popularity. However, 3D has gained popularity in certain fields, such as the film "Avatar".

The second area of concern is tied to the gaming industry, where 3D effects offer the player an enthralling experience and serve as the game's backbone. When looking at applications in the real world, augmented reality can provide a link that is otherwise missing between the digital and physical surroundings. Augmented reality has the potential to completely transform the way players engage with interactive mediums. On the other hand, augmented reality (AR) technology in gaming relies on the player's senses to help them locate themselves within the virtual environment. Another key consideration is the context in which augmented reality technologies are used, with a particular emphasis on mobile devices, head-mounted displays (HMDs), and smart glasses that come with AR software already installed. The program is able to recognize an object when a user aims at the device and looks at it because it does an analysis of the video stream using computer vision technology.

Augmented reality integrates the visual and auditory content of the game with the environment that the player is in at the same time. Augmented reality games make use of an already existing setting and superimpose a playing field within it while virtual reality games frequently call for a dedicated room or other enclosed location in order to successfully create an immersive world. A common feature of augmented reality games is the superimposition of user-generated environments on top of the user's actual surroundings. Games with a higher level of augmented reality capability can construct environments that are depending on the user's location. AR may display real-time data from products and let users control them via touchscreen, voice, or gesture. AR might also provide a glimpse of real-time data streaming from products.

A user, for example, may send a command to a product by clicking a stop button on an augmented reality experience's digital visual overlay, or they could just say the word "stop." The cloud would then relay the command to the item. When dealing with an industrial robot, an operator using an augmented reality headset may see overlay data about the robot's performance and have access to its controls. A player's avatar in such a game, for example, might be able to walk across a digital bridge to get from a coffee table to a couch. When the user moves, the augmented reality display adjusts its size and orientation to fit the new surroundings. New graphical or text information comes into view while other information passes out of view. The process of creating a setting is one of the most time-consuming aspects of developing a video game.

Despite this, there is a constant desire for new scenery since players will synchronize the states of hundreds of millions of users located all over the world, as well as the virtual objects that interact with those users. switch to new scenes once they have fully explored the one, they are currently in. This augmented reality game expands the playing area even further by incorporating a range of real-world

locations to ensure that the game appears fascinating to the player (Tech Target Contributor, 2016). Niantic, Inc. is an augmented reality (AR) firm that makes use of technology to bring the concept of augmented reality into the actual world. Niantic's Augmented Reality technology has been successfully implemented in a variety of the company's products, including Field Trip, Ingress, and Pokémon GO, amongst others. In order to create a metaverse that is based in the real world, it is necessary to Add, it is necessary to precisely attach those users and objects to the real world. On the Niantic Lightship platform, Pokémon GO was the very first game to ever exist. This indicates that millions of users will be able to build, modify, and interact with digital items that are present in the realworld while preserving a consistent and shared experience (Hanke, 2021).

Advantage and Disadvantage of AR

There are wide advantages of Augmented Reality, but Augmented Reality also has its own disadvantages that can give an impact toward mankind. The first advantage of Augmented Reality is the capability of it to enhance and encouraging user physical activities. User has a chance to experience a better quality of life by using Augmented Reality technology. These includes in navigation and gaming. For illustration, most of modern car nowadays are included with Augmented Reality in its system. Tesla is one of the big companies that implementing Augmented Reality in their cars. Augmented Reality helps to predict or estimate the possible consequence that may be happen. According (Lang, 2020), Tesla has implementing Augmented Reality in their cars for autopilot driving. The car can analyze its surrounding for a better driving experience. The second advantages of Augmented Reality are by increasing the knowledge and understanding of user. IKEA is a furnishing company that has applied Augmented Reality in their application which allow the user to organize and coordinate the layout of their customer personal space. By downloading IKEA apps, the user can boost up their understanding and information about the size, the location, and the possible look of their house according to the user preference. Besides IKEA, NIKE company also grab the chance to implementing Augmented Reality in their apps. The user can calculate their foot size by pointing their smartphones at their feet. This technology has increased the customer understanding of the size of their foot before purchasing the item. Next advantage of Augmented Reality is it helps the user in exploring new area. Nowadays, many gaming 5 company has set up Augmented Reality in their gaming application such as Pokémon Go. This gaming gives the user experience in exploring new area to completing the quest.

Augmented Reality also equally has its own disadvantages. The first drawback of Augmented Reality is its tendency in increasing the user screen time. Even though Augmented Reality helps boosting the user life but on the other hand the user tends to be focused more on-screen time which could lead to many problems such as lesser affection of attention on user life. Lack of attention or communication among the user can cause less mutual touch or loss of mutual relationship in their circle. According to experts, excessive of screen time can affect a parent-child relationship (Turner, 2019). The child may pay more attention on the gaming and screen time which leading to less communication

among the family members. Communication among the family members is vital to help in growing more love and understanding of each family member life problem. Another disadvantage of Augmented Reality is the costing to implement this technology in the system. As claimed by the experts, simple Augmented Reality such as Marker Based AR can start from 1000 USD to 2000 USD in the making. If it involves more complex Augmented Reality, the cost can jump to 10,000 to 200,000 USD (Bhatt, 2022). Usually, a big corporate is more afforded to spend on this big budget such as Niantic company (Pokémon Go game), Inter IKEA Systems B.V. (IKEA Place application) and Alphabet Inc. (Google Maps navigation application). The last drawback of Augmented Reality is it can affect the user mental health in a long run. As stated, Augmented Reality can enhance the user surrounding but if the user is too depending on the advance, the user can develop a tendency of seeing things that untrue. For instance, Pokémon Go gaming can disturb the user eyesight in a long run. The user will begin to seek for Pokémon at their neighborhood even though it was not there. Augmented Reality also can disturb the user mental health by depending too much on the technology which creating lesser survival skill.

Pokémon Go



Figure 1: Logo of Pokémon Go

The ever-evolving technological landscape has opened the door to the possibility of revolutionary new experiences that can be had through the use of augmented reality and virtual reality. The gaming business is one that stands to benefit tremendously from the application of augmented reality technology. In addition to this, there is a clear trend in the market towards mobile gaming (Mignogna, 2018). The introduction of the augmented reality (AR) game Pokémon GO in 2016 was a seminal event that brought to light the possibilities of AR in the gaming industry. Niantic, in conjunction with Nintendo and The Pokémon Company, has distributed this game for mobile platforms such as iOS and Android as part of the Pokémon franchise. The continuation of the use of augmented reality technology was significantly impacted by Nintendo's second-ever release for mobile devices, which was a major game changer. Mobile devices equipped with GPS are required to play Pokémon Go, which allows users to hunt down, capture, train, and battle fictitious animals known as Pokémon. The player's actual location is not represented in the game, despite the fact that it seems to be there.

The Pokémon video game series has drawn inspiration for its fantasy settings from real-world locations such as New York, Paris, Japan's Hokkaido and Kanto regions. The game is free to play and

uses a premium business model with local advertising and in-app purchases for additional in-game items. The game also started with about 150 Pokémon species, which increased to about 700 by 2021. This game has enticed more people to download the application and play by themselves. It is credited with popularizing location-based and augmented reality technology.

Gameplay Pokémon Go

Niantic's approach to the Pokémon series was incredibly forward-thinking, using AR in its gameplay almost in totality. In Pokémon GO, users catch different Pokémon and power them up to combat. Pokémon Go integrates the actual world into its virtual reality by using Google Maps. GPS technology is used to map these Pokémon to real-world locales. PokeStops at various real-world sites help with this by delivering items for collecting and battling Pokémon. The game's two most known interfaces are the Map View and the Wild Pokémon Encounter Screen. The Map View is the game's main screen, from which you may access the majority of the game's aspects. The screen displays a map of the trainer's real-world surroundings as well as game components such as Pokémon, PokeStops, and Gyms.



Figure 2: Map View

The use of augmented reality in Pokémon GO is an important component of the game because it enables the virtual world to connect and engage with the real-world surroundings of the player. The game makes use of augmented reality in order to position Pokémon in the player's immediate environment. The Pokémon GO app needs to have permission to use the player's camera in order for augmented reality to work, and it also uses gyroscope sensors in order to figure out where the player is holding their mobile device. It is still possible to access augmented reality even if the player's mobile device does not have a gyroscope or if the gyroscope is not functioning properly. However, the experience will be significantly diminished because the Pokémon will appear in a fixed position and only its background will use camera feed.



Figure 3: How gyroscope sensors aiming the Pokémon

When searching around the neighborhood for PokeStops, it probably saw plenty of Pokémon. Pokémon is random. Some are more likely to appear in certain places. Track nearby creatures using the Nearby function at the bottom right of the screen. By clicking on a Pokémon, the game will show its location. Pokémon GO's sightings feature gives hints about nearby Pokémon but doesn't give directions.



Figure 4: How in-game world looks when detect location a Pokémon

Pokémon GO is a mobile AR game, so it catches Pokémon in real life. Need to throw a PokeBall at the Pokémon to capture. If done correctly, the PokeBall will catch the Pokémon. A new technology and applications are being created with augmented reality thanks to Pokémon GO, which succeeded in popularizing it. In Pokémon Go, users may wander around the actual world while pointing their phone camera in all directions. As doing this, fictitious creatures like Pokémon and other things will appear on the phone's screen, giving the world a completely new dimension.



Figure 5: How to catch Pokémon in real life

Minecraft Earth



Figure 6: Logo of Minecraft Earth

In this day and age of advanced globalization, there are many different kinds of games that have been developed for all different kinds of users. Among the sandbox games that use augmented reality and are based on geolocation, one of those games is Minecraft Earth. Mojang Studios is responsible for the creation of this game, and Xbox Game Studios is the company that published it. The use of a GPS-tracked world map makes Minecraft Earth not only an augmented reality game but also a location-based game. This is because the game uses a world map. A free-to-play version of one of the most popular games ever created, Minecraft Earth is reimagined around the concept of augmented reality for mobile devices like the iPhone and Android. The game is available for both platforms. It's a lot like Pokémon Go, which was the game that got everyone excited about augmented reality gaming. But, unlike that game, Minecraft Earth is entirely dedicated to the concept of augmented reality. Users not just bump into a random Pikachu on the street, but construct complex Minecraft constructions that everyone can see. In addition to this, it utilizes the user's smartphone as a gateway to the online world. Since its release in 2019, Minecraft Earth has progressed from being a PC game driven by the community to being playable on consoles and virtual reality headsets. The video game industry is undergoing a sea change thanks to Mojang, the developer of the popular game Minecraft. The popular computer-generated world of Minecraft is now available as a mobile game called Minecraft Earth, which allows players to interact with their actual environments in addition to experiencing the game's simulated ones (Microsoft News Centre UK, n.d.).

The original Minecraft game was reimagined as an augmented reality experience in the form of Minecraft Earth, much like Ingress and Pokémon Go before it. The Bedrock engine was used to develop the actual game itself. It featured many gameplay elements that were entirely original as well as interactions that were similar to those in the main game. The objective of Minecraft Earth is to transform augmented reality gaming from an experience limited to a single player into a dynamic, breathing digital world that can be explored by a group of people simultaneously. "Tappable" are similar to "Pokestops" in Pokémon Go; however, in Minecraft Earth, these "tappable" are randomly dispersed throughout the world around players. These are designed to give users small rewards that allow to build things, and try to collect as many of these as they can in order to get resources and items that can be used to build expansive structures in the building mode. The location-based gameplay in this game was powered by OpenStreetMap which includes annotated and inferred data regarding districts, private property, safe and dangerous locations and Microsoft Azure Spatial Anchors that gives shared mixed reality experiences on HoloLens, iOS, and android devices a common coordinate frame that keeps track of all the players. This technology created a seamless experience by syncing the position of build plates in multi-player by referencing objects in the real world, making the experience more immersive.

Gameplay Minecraft Earth

Minecraft Earth has two modes of games which are Adventures and Build plates. Minecraft's adventure mode lets players explore other players' maps. In adventure mode, creators can construct a story-based game. Players may fight mobs, find items not available with tappable, and gain rewards in an adventure.

The adventure location displays quest information when tapped. When the Play button was pressed in the adventure build plate, the device's camera was turned on, and the game's graphics were shown on top of the real-world image. The player needed to put a build plate in a safe place so that the game could be played. On the build plate, structures both underground and above ground were made. Most adventures had structures like cobblestone, grass, and fences, as well as animals on the ground and in the air. However, some adventures looked like a hole in the ground.



Figure 7: Build Plate that need to be put at safe place and structures both underground and aboveground

In Minecraft Earth, more than one player can go on the same adventure at the same time. During the adventure, the tools that other players hold show what they look like. When a player looks at another player, they can see both their real-world image and the tools that player is holding. As shown in the picture below, another player appears holding the object he was holding at the time in the real world.

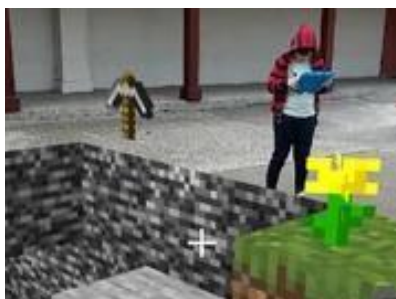


Figure 8: Another player appears holding the object in the real world

Next, a build plates mode was an area in Minecraft Earth where the player could construct structures (Swatman, 2016). The new player has an 8×8 build plate available by default. The player selects a surface in the real world to place the build plate on, and once placed, the player sees the build plate superimposed on the real-world camera view. An open space and a flat surface are required to place the building plate. Players can also interact with items or mobs in their build plate. Players can physically move around the build plate to see it from different angles and to build structures (Warren, 2019). Build plates can be used anywhere and work like a private realm. They use Bedrock Engine, so red stone, physics and other game elements are the same as in Bedrock Edition. Players can invite friends to build with them locally, and then they can share the world with others by sending them a link.



Figure 9: Image of build plate demo on flat surface



Figure 10: Image when inviting friends to a build plate

Differences of Augmented Reality (AR) and Virtual Reality (VR)

Augmented Reality and Virtual Reality may sound near but in reality, both of it has a totally different meaning and function. The first difference between Augmented Reality and Virtual Reality is Virtual Reality used up to 75% visuality while Augmented Reality only used up to 25% visuality. This is due to Virtual Reality creating a whole new whole for the user such as it does in gaming, but Augmented Reality only helps enhance the view of user's physical world. Next, the most vivid difference between Augmented Reality and Virtual Reality is Virtual Reality need up the usage of headset devices. This is contrary with Augmented Reality because Augmented Reality does not need the usage of headset to function. Augmented Reality can be applied inside a smartphone or any other object but not fixed at the headset unlike Virtual Reality. Besides, Virtual Reality providing an immersive experience to the user while Augmented Reality enhancing a real-world scene. To illustrate, Virtual Reality able to create a whole unrealistic world to the user just like it does in gaming, but Augmented Reality helps to enhance and adding information to the user realistic world. In the end, the difference between Virtual Reality and Augmented Reality is Virtual Reality holds the control of user view depending on the system and game, but Augmented Reality are in contact with realistic and physical world.

Augmented Reality for Future Gaming Industry

The gaming industry is one of the largest industries since it constantly improves the games it produces. The production of video games has undergone a significant transformation as a result of the advancement of modern technology, which encourages businesses to adopt new technologies to make the game more distinctive than before. Aside from that, the Coronavirus crisis has resulted in major growth in the gaming industry. In situations where people are unable to leave their homes or should avoid physical interactions, video games have become a major source of entertainment.

According to a market research firm, global gaming revenue could reach \$203.1 billion in 2022, up from \$139 billion in 2020. Furthermore, Asia has the world's largest video gaming market, with approximately 1.48 billion players, followed by Europe, which has over 715 million players. Globally, an estimated 3.24 billion people will play video games by 2022. Not to mention, with so many people spending their time online, it is easy to see how this will become a growing trend, not just for entertainment purposes, but also for the monetary incentive that this one-of-a-kind opportunity provides. According to data analysis, the global gaming market is expected to reach \$268.8 billion by 2025, up from \$178 billion in 2021.

Augmented Reality games combine a realistic image with noises and other sensations to provide fictitious experiences that stimulate the player's physical presence in the area. As the user's expectations rise and they seek ever more immersive gaming experiences, they will discover through AR a complete virtual world that substitutes that real one and is controlled by body gestures.

As a result, this is an excellent start for AR technology. The online gaming business has grown enormously in recent years, hitting a record of \$175 billion in sales with over 2.7 billion gamers globally, and is anticipated to grow even more in the future (Spaziani, 2022).

In augmented reality, players do not need to spend much money to enjoy the same amount of enjoyment. It may soon take over from traditional gaming, where virtual reality games never managed to succeed. As technological advances and other complementary technologies such as 5G become available, the experience will improve by allowing for more dynamic scenes and the incorporation of more advanced mobile games such as AR shooter games, which can bring more fun to the AR gaming world. Various large manufacturers have introduced numerous augmented reality applications over the years, providing gamers with new ways to interact with the real world. The steady increase in the number of mobile gamers has boosted the demand for augmented reality games. They anticipate that this tendency will continue over the next five years. The primary demand drivers for this industry are currently China, the United States, and Japan (Eastern Daylight Time, 2022).

Augmented reality has enormous potential and appears to have limitless capacities. Games like Pokémon Go have already shown its effectiveness on smartphones. This is especially essential as an increasing number of gamers want to play games on their phones and tablets. According to Newzoo's Global Market Report Service, mobile gaming income will account for more than half of total gaming revenue. This just goes to show that the mobile gaming market is massive and only going to get bigger. As a result, it is not a huge leap to say that mobile gaming will have a significant impact on the future of gaming. Teddy bears, board games, colouring books, and action figures may all be layered with augmented reality. Essentially, augmented reality may breathe new life into old and weary toys that were on their way out with the arrival of mobile gaming. For example, AR allows a teddy bear to come alive by aiming a smartphone at it, giving the user the experience of a best friend, they can talk to or a pet they can care for. Apple, Google, and practically every other corporation in Silicon Valley are working to push AR to the forefront, allowing AR experiences to feel more realistic and engaging. AR also allows children to be children again, jumping up and down in their own homes or running around their neighborhood instead of sitting and staring at a screen all day. That is how the future of gaming appears, and what AR promises (Datar, 2019).

For instance, JamShoot is one of the most recent games to hit the market, giving a completely new form of AR gaming experience. It's the first arcade shooter game with a dynamic scene and augmented reality aspects, which means you can play it anywhere for an immersive mobile gaming experience. The JamShoot AR mobile app is a fantastic game for both children and adults, giving a world-changing shooter game for anyone who enjoys gaming and is curious about how AR will impact shooter games in the future (Is Augmented Reality the Future of Gaming? , 2022).

Conclusion

As a conclusion, AR can be viewed as a new communication medium or tool in an early stage due to several important technical and societal obstacles, as well as the fact that it involves information technology. The cell phone is a device for AR applications, which could pave the way for widespread AR deployment. In light of the increasing ubiquity of information and interactivity via smart devices and sensors, AR will give personalized, perceptual, and location-based information. The augmented reality market will continue to increase in the coming years, particularly as technology becomes more accessible to consumers. With a growing emphasis on metaverse technology, many firms are looking to AR as the next step. It has already been shown that Augmented Reality can improve the way we create for people. It has been demonstrated that by utilizing the AR feature, people may better perceive and appreciate design. With all of the supporting information and analyses, I must conclude that AR has the potential to change the design dynamic by making the process more transparent and comprehensive between the creator and the community engaged.

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ANALISA PENCAPAIAN MATEMATIK BAGI PELAJAR PRA-DIPLOMA SAINS

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ABSTRAK

Program Pra-Diploma Sains merupakan program yang memberi peluang kepada pelajar-pelajar yang mendapati keputusan Sijil Pelajaran Malaysia (SPM) yang kurang memuaskan untuk menyambung pelajaran dan seterusnya boleh memohon ke program Diploma. Namun begitu, pencapaian markah subjek matematik bagi pelajar Pra-Diploma Sains didapati menurun pada semester terkini (Okt 2022 – Feb 2023). Sehubungan dengan ini, kajian berkaitan pencapaian markah subjek matematik dijalankan. Kajian ini hanya tertumpu kepada subjek matematik perantaraan sahaja di mana perbandingan diukur bagi pencapaian markah di antara dua semester iaitu Okt 2022 – Feb 2023 dan Okt 2021 – Feb 2022. Pengambilan Pra-Diploma Sains hanyalah pada sesi Okt – Feb sahaja di kampus Pulau Pinang dan ianya adalah berbeza bagi setiap kampus. Kajian ini juga mengkaji prestasi matematik di antara pelajar lelaki dan perempuan. Markah penilaian diambil bagi 84 orang pelajar yang terdiri dari dua semester terkini. Berdasarkan data deskriptif, didapati pencapaian purata markah pelajar bagi semester Okt – Feb 2022 (dalam talian) adalah lebih baik berbanding Okt – Feb 2023 (bersemuka). Manakala pencapaian pelajar perempuan dan lelaki adalah hampir sama. Analisa dilanjutkan lagi dengan menggunakan Ujian-t bagi mengesahkan dapatan yang dianalisa secara deskriptif adalah signifikan secara statistik. Berdasarkan Ujian-t, didapati keputusan adalah sama dengan analisa deskriptif. Kesimpulannya, pencapaian didapati menurun pada semester terkini apabila kaedah pembelajaran talian diubah semula kepada pembelajaran bersemuka sepenuhnya. Kemerosotan ini perlu diatasi agar pencapaian markah dalam matematik perantaraan ini semakin meningkat dari semester ke semester dan para pelajar dapat melayakkan diri ke peringkat Diploma.

Kata kunci: Pra-Diploma Sains, SPM, matematik perantaraan, data deskriptif, Ujian-t

Pengenalan

Program Pra Pendidikan Tinggi (PPT) UiTM ini dahulunya adalah program yang dikenali sebagai Program Mengubah Destini Anak Bangsa (MDAB). Program ini berteraskan kepada falsafah universiti yang percaya bahawa bahawa seseorang individu itu mampu berusaha untuk mencapai kecemerlangan melalui pemindahan ilmu dan penerapan nilai-nilai murni.

Tujuan utama program PPT adalah untuk mengambil pelajar – pelajar lepasan SPM yang memperolehi keputusan SPM yang kurang menepati syarat-syarat keperluan UPU. Program PPT adalah terbuka kepada golongan B40 dan juga bukan B40 agar kesemua mereka dapat meneruskan pengajian ke peringkat yang lebih tinggi.

Terdapat beberapa program yang diperkenalkan di bawah PPT. Di antaranya ialah Pra-Diploma Perdagangan, Pra-Diploma Sains, Pra-Diploma Sains (Aliran STEM C & Sastera), Pra-Diploma Agroteknologi dan Pra-Diploma Pengajian Islam.

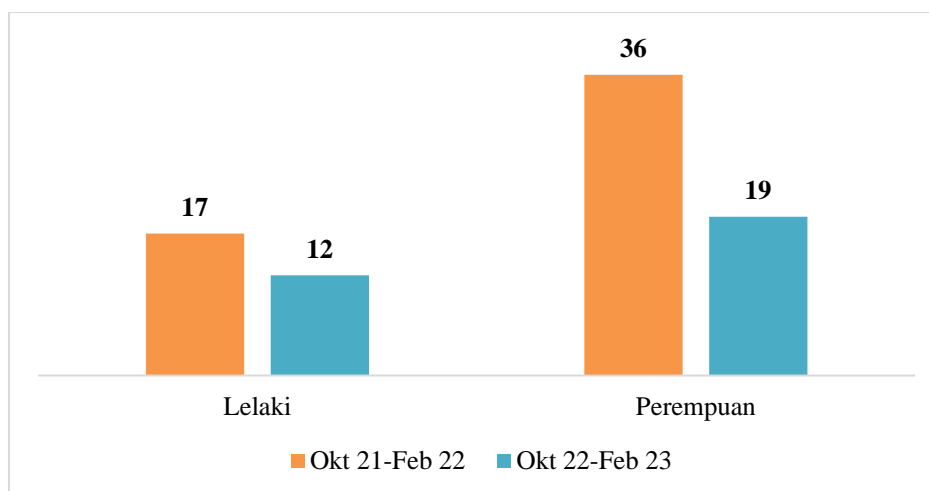
Di antara subjek yang akan diambil oleh pelajar Pra-Diploma Sains ialah matematik. Terdapat dua subjek matematik yang perlu diambil iaitu matematik asas dan matematik perantaraan. Selain itu, pelajar juga dikehendaki mengambil subjek Fizik, Kimia, Bahasa Inggeris, ‘*Study Skills*’ dan Biologi. Hanya aliran fizikal & biologi sahaja yang perlu mengambil satu lagi subjek tambahan iaitu Biologi. Namun, pelajar dalam aliran fizikal tidak perlu mengambil subjek biologi. Kemerosotan pencapaian markah bagi subjek matematik perlu diatasi memandangkan ianya boleh mempengaruhi CGPA. Pelajar hanya layak ke program Diploma dengan minimum CGPA 2.00.

Menurut kajian Siti, Noor ‘Aina, Maisurah dan Fadzilawani (2017), faktor pencapaian matematik moden semasa SPM mempengaruhi prestasi matematik semasa pembelajaran di peringkat Pra-Diploma Sains. Kajian ini juga mendapati pelajar banyak melakukan kesilapan asas dalam langkah pengiraan terutamanya kesilapan dalam penggunaan kaedah. Kajian Maisurah (2017) pula mendapati kebanyakan pelajar masih tidak dapat menggunakan kaedah yang tepat dan seterusnya gagal mempermudah jawapan yang ditunjukkan dalam menjawab soalan asas matematik. Ini merupakan salah satu faktor yang menyumbang kepada penurunan pencapaian matematik.

Norhafinas, Mohd. Nizam dan Junaidah (2021) mendapati bahawa tiada perbezaan dari segi pembelajaran bagi pelajar lelaki dan perempuan. Namun kajian ini hanyalah tertumpu kepada peringkat soal selidik sahaja dan data sampel adalah terhad bagi kaedah pembelajaran dalam talian. Faktor sikap pelajar iaitu minat, keyakinan, kebimbangan dan persepsi pelajar terhadap kegunaan matematik mempengaruhi pencapaian pelajar pra-universiti dalam matematik (Chiu & Muhd Sofwan, 2021). Menurut Ayob dan Yasin (2017), sikap positif terhadap pembelajaran matematik dapat meningkatkan prestasi matematik.

Metodologi

Kajian ini melibatkan seramai 84 orang pelajar Pra-Diploma Sains yang terdiri dari dua semester iaitu Okt 2021 – Feb 2022 dan Okt 2022 – Feb 2023. Rajah 1 berikut menunjukkan data deskriptif bagi sampel kajian yang dikaji mengikut semester dan jantina. Didapati bilangan pelajar lelaki adalah 17 orang bagi semester Okt 2021 – Feb 2022 dan 12 orang bagi semester Okt 2022 – Feb 2023. Manakala seramai 36 orang pelajar perempuan bagi semester Okt 2021 – Feb 2022 dan 19 orang pelajar perempuan bagi semester Okt 2022 – Feb 2023. Secara keseluruhannya, seramai 29 pelajar lelaki dan 54 pelajar perempuan bagi kedua-dua semester. Sejumlah 53 pelajar dan 31 pelajar masing-masing bagi semester Okt 2021 – Feb 2022 dan Okt 2022 Feb 2023.



Rajah 1: Bilangan sampel pelajar Pra-Diploma Sains

Selain menggunakan deskriptif data statistik, kajian ini juga menggunakan Ujian-t bagi menguji beberapa hipotesis. Ujian Levene juga dilaksanakan sebelum Ujian-t diteruskan bagi menyemak andaian kehomogenan varians. Hipotesis dalam Ujian-t dijalankan bagi menguji kesamaan min markah mengikut semester yang berbeza dan juga mengikut jantina.

Analisa dan Perbincangan

Dengan menggunakan data deskriptif, perbandingan min markah mengikut semester dan jantina dapat diperolehi seperti yang ditunjukkan dalam Jadual 1. Didapati pencapaian markah bagi pelajar perempuan dan lelaki adalah agak tinggi pada semester Okt 2021 – Feb 2022 jika dibandingkan dengan semester Okt 2022 – Feb 2023. Namun pencapaian markah di antara pelajar lelaki dan perempuan adalah hampir sama di mana tidak terdapat perbezaan yang ketara.

Jadual 1: Min markah pelajar Pra-Diploma Sains

		Jantina	
		Lelaki	Perempuan
Semester	Okt 22 – Feb 23	60.8	62.4
	Okt 21 – Feb 22	74.7	74.2

Jadual 2 di bawah pula menunjukkan min markah mengikut semester dan jantina. Didapati min markah bagi semester Okt 2021 – Feb 2022 lebih tinggi jika dibandingkan dengan Okt 2022 – Feb 2023. Min markah bagi pelajar lelaki dan perempuan bagi gabungan kedua-dua semester tidak mempunyai banyak perbezaan iaitu sebanyak 1.1 sahaja di mana masing-masing mempunyai min markah 66.6 dan 67.7.

Jadual 2: Min markah

Keterangan	Okt 22 – Feb 23	Okt 21 – Feb 22	Lelaki	Perempuan
Min Markah	61.9	74.4	66.6	67.7

Seterusnya, Ujian-t dijalankan terhadap dua hipotesis. Hipotesis yang pertama ialah bagi menguji perbezaan min markah bagi dua semester berbeza:

$H_0: \mu_{\text{Okt 22 – Feb 23}} = \mu_{\text{Okt 21 – Feb 22}}$ (Min markah adalah sama bagi kedua-dua semester)

$H_1: \mu_{\text{Okt 22 – Feb 23}} \neq \mu_{\text{Okt 21 – Feb 22}}$ (Min markah adalah berbeza bagi kedua-dua semester)

Berdasarkan analisa yang diperolehi dalam Jadual 3, boleh disimpulkan bahawa terdapat perbezaan pencapaian min markah bagi kedua-dua semester. H_0 ditolak sekiranya nilai-p adalah kurang daripada nilai 0.05 (nilai-p = .001 < 0.05). Bagi menentukan min markah semester yang mana satu adalah lebih besar, nilai selang keyakinan akan dianalisa. Didapati 95% selang keyakinan bagi min markah kedua-dua semester mempunyai nilai negatif di mana $\mu_{\text{Okt 22 – Feb 23}} - \mu_{\text{Okt 21 – Feb 22}} < 0$; $\mu_{\text{Okt 22 – Feb 23}} < \mu_{\text{Okt 21 – Feb 22}}$. Ini menunjukkan bahawa pencapaian markah bagi semester Okt 2021 – Feb 2022 adalah lebih tinggi jika dibandingkan dengan pencapaian markah bagi semester Okt 2022 – Feb 2023.

Jadual 3: Output SPSS

t	df	Sig.	95% Confidence Interval of the Difference	
			Lower	Upper
-3.395	82	.001	-19.856	-5.183

Ujian-t bagi hipotesis yang kedua adalah bagi menentukan kewujudan perbezaan min markah bagi jantina. Hipotesis yang digunakan ialah:

$H_0: \mu_{\text{lelaki}} = \mu_{\text{perempuan}}$ (Min markah adalah sama bagi kedua-dua jantina)

$H_1: \mu_{\text{lelaki}} \neq \mu_{\text{perempuan}}$ (Min markah adalah berbeza bagi kedua-dua jantina)

Jadual 4: Output SPSS

t	df	Sig.	95% Confidence Interval of the Difference	
			Lower	Upper
.024	82	.981	-7.855	8.049

Berdasarkan nilai $p = .981$, nilai ini lebih besar dari nilai 0.05 dan dengan ini dapat disimpulkan bahawa pencapaian min markah adalah sama bagi kedua-dua jantina. Pernyataan ini disokong dengan nilai keyakinan dalam Jadual 4 di mana 95% selang keyakinan adalah di antara -7.855 dan 8.049. Terdapat nilai 0 dalam selang keyakinan dan ini membuktikan nilai min bagi kedua-dua kumpulan adalah sama iaitu tidak terdapat perbezaan dari segi pencapaian markah bagi pelajar lelaki dan perempuan.

Kesimpulan

Berdasarkan analisa dan keputusan yang diperolehi, dapat disimpulkan bahawa keputusan pencapaian markah matematik perantaraan bagi pelajar lelaki dan perempuan adalah sama. Manakala pencapaian markah adalah berbeza mengikut dua semester yang dikaji. Berdasarkan analisa, didapati markah matematik perantaraan adalah lebih baik semasa pembelajaran dalam talian jika dibandingkan dengan markah semasa pembelajaran secara bersemuka. Selain dari faktor kaedah pembelajaran, faktor lain juga boleh mempengaruhi pencapaian markah matematik contohnya seperti masalah peribadi pelajar itu sendiri ataupun minat dan sikap pelajar terhadap matematik. Bagi mengetahui dengan lebih lanjut, pengkaji mencadangkan untuk mengambil lebih banyak data bagi semester sebelum (dalam talian) dan juga data bagi semester yang akan datang (bersemuka). Ini adalah bagi mengetahui samada faktor kaedah pembelajaran mempengaruhi atau tidak prestasi markah matematik perantaraan. Selain itu, data bagi faktor lain juga perlu diambilkira supaya masalah dapat dikenalpasti dan seterusnya dapat mengatasi masalah ini agar pencapaian bagi subjek matematik terus meningkat.

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ANALISA KESALAHAN DALAM MATEMATIK INTENSIF: KAJIAN KES TERHADAP PELAJAR PRA DIPLOMA PERDAGANGAN

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ABSTRACT

Kajian ini bertujuan untuk mengenalpasti topik spesifik dalam subjek Matematik Intensif yang menjadi punca kesilapan tertinggi dikalangan pelajar dalam menjawab soalan peperiksaan penilaian akhir semester. Ia juga dijalankan untuk melihat pola-pola kesalahan yang dilakukan oleh pelajar dalam topik spesifik tersebut. Set soalan peperiksaan penilaian akhir semester diuji dengan enam topik utama mengikut silibus kursus. Sebanyak 56 skrip jawapan pelajar disemak dan dianalisa untuk dijadikan sampel kajian. Markah pelajar telah dianalisa terlebih dahulu mengikut topik secara deskriptif dan didapati skor markah bagi topik Algebra adalah kurang memuaskan berbanding topik yang lain. Dapatan kajian menunjukkan tumpuan utama perlu diberikan pada topik Algebra kerana berdasarkan min markah jawapan yang betul paling rendah diperolehi. Terdapat pola-pola kesalahan yang dilakukan oleh pelajar dalam topik tersebut antaranya pola kesalahan dalam perkembangan, pemfaktoran serta meringkaskan ungkapan pecahan Algebra. Diharapkan kajian ini dapat memberi gambaran awal kepada para pensyarah tentang tahap penguasaan dan kefahaman matematik dikalangan pelajar pra diploma sebelum mereka meneruskan ke peringkat diploma dengan menambahbaik proses pengajaran dan pembelajaran, merancang pendekatan yang sesuai untuk membantu pelajar dan membolehkan ianya dijadikan sebagai penanda aras untuk mencari penyelesaian kepada masalah ini.

Keywords: topik, algebra, pola, kesalahan

Pengenalan

Matematik Intensif merupakan kursus teras yang wajib diambil bagi pelajar yang mengikuti program pra diploma perdagangan. Kursus ini disediakan untuk mempertingkatkan asas matematik bagi menyediakan pelajar mengikuti kursus seterusnya di peringkat diploma. Kursus ini wajib lulus bagi menempatkan pelajar ke program diploma. Pada akhir kursus, pelajar seharusnya dapat menguasai operasi Arithmetik, Algebra serta menyelesaikan masalah berkaitan persamaan Algebra, Fungsi, Indeks, Logaritma, Jujukan, Matematik Perniagaan dan Perangkaan serta Aplikasi Matematik dalam asas Perniagaan, Kewangan dan Pelaburan.

Diperingkat pra diploma, kursus matematik yang ditawarkan adalah asas matematik yang telah dipelajari di peringkat sekolah menengah merangkumi tajuk di dalam Matematik Moden. Penguasaan asas matematik yang baik di peringkat sekolah menengah penting bagi pelajar pra diploma perdagangan. Hal ini kerana supaya tidak menimbulkan pelbagai kesukaran dalam pemahaman matematik di

peringkat seterusnya. Penentuan tahap penguasaan konsep dan kemahiran dalam sesuatu topik tidak dinafikan pentingnya dalam pendidikan matematik. Menurut Marlina (2010) dapatan kajian yang dijalankan oleh Saripah Latipah mengakui kefahaman amat penting dalam pengajaran matematik yang berkesan dalam jangka masa yang panjang. Hasil kajian Norshafariza (2022) mendapati tumpuan utama perlu diberikan kepada kefahaman konsep asas dan mempelbagaikan pendekatan pembelajaran matematik bagi mengatasi kelemahan penguasaan konsep asas matematik. Menurut kajian Ku dan Johnson (2018) menyatakan dari kajian Subahan, untuk menguasai mata pelajaran matematik di peringkat yang lebih tinggi pelajar perlu mempunyai pengetahuan peringkat sebelumnya dan tambahan beliau lagi kelemahan kefahaman konsep asas semasa melalui pembelajaran matematik dalam kelas merupakan faktor utama yang menentukan keupayaan pelajar dalam penguasaan pembelajaran matematik. Dalam kajian Maisurah et al. (2017) menyatakan bahawa Miswan, Mohd Sazali, Khairul Amin dan P.Siva telah melakukan kajian mereka mengenai pelajar sekolah menengah dan pra universiti didapati menghadapi masalah penguasaan konsep dan kemahiran algebra yang sangat serius dan perlu diberi perhatian. Menurutnya juga mengikut kajian Egodawatte menyatakan masalah yang sama dikalangan pelajar dan pra universiti iaitu melibatkan kesalahan terhadap konsep pembolehubah, ungkapan Algebra, persamaan Algebra dan masalah berayat.

Terdapat topik-topik asas dalam matematik yang sering menjadi kesilapan dikalangan pelajar dari peringkat sekolah menengah sehingga peringkat universiti. Algebra ialah salah satu antara topik asas matematik yang kerap menjadi kesalahan dikalangan pelajar. Rosfazliszah (2019) menyatakan topik pengembangan dan pemfaktoran ungkapan Algebra telah mula dipelajari seawal tingkatan satu dan terus diaplikasikan sehingga ke peringkat universiti tetapi pelajar-pelajar masih mengalami masalah dalam topik ini. Tujuan kajian ini adalah untuk mengenalpasti topik spesifik dalam subjek Matematik Intensif yang menjadi punca kesilapan tertinggi dikalangan pelajar dalam menjawab soalan peperiksaan penilaian akhir semester. Melalui kajian ini dapat memberikan gambaran awal kepada para pensyarah tentang tahap penguasaan dan kefahaman terhadap sesuatu topik dalam kalangan pelajar pra diploma lebih jelas sebelum mereka memasuki peringkat diploma.

Metodologi

Kajian ini dijalankan terhadap pelajar yang mengikuti program pra diploma perdagangan dan mengambil subjek Matematik Intensif. Data diperolehi daripada 56 orang pelajar melibatkan proses penganalisaan data berbentuk kuantitatif melalui pemeriksaan dokumen skrip jawapan peperiksaan. Instrumen kajian adalah melalui set soalan peperiksaan penilaian akhir semester untuk menggambarkan pencapaian keseluruhan pelajar. Dalam set soalan peperiksaan penilaian ini, responden perlu menjawab 7 soalan subjektif dalam tempoh masa 3 jam yang mengandungi kombinasi enam topik utama mengikut silibus kursus yang telah dipelajari sepanjang semester. Bentuk soalan-soalan yang diuji juga telahpun

dipelajari semasa diperingkat sekolah menengah di dalam subjek matematik moden. Skrip jawapan pelajar disemak dengan teliti dan markah pelajar telah dianalisa terlebih dahulu mengikut topik yang terlibat secara deskriptif. Statistik deskriptif iaitu min dan peratusan digunakan untuk menganalisis data. Jadual 1 berikut menunjukkan pembahagian topik yang terlibat dalam set soalan peperiksaan penilaian akhir semester.

Jadual 1: Topik Soalan Peperiksaan Penilaian Akhir Semester Matematik Intensif

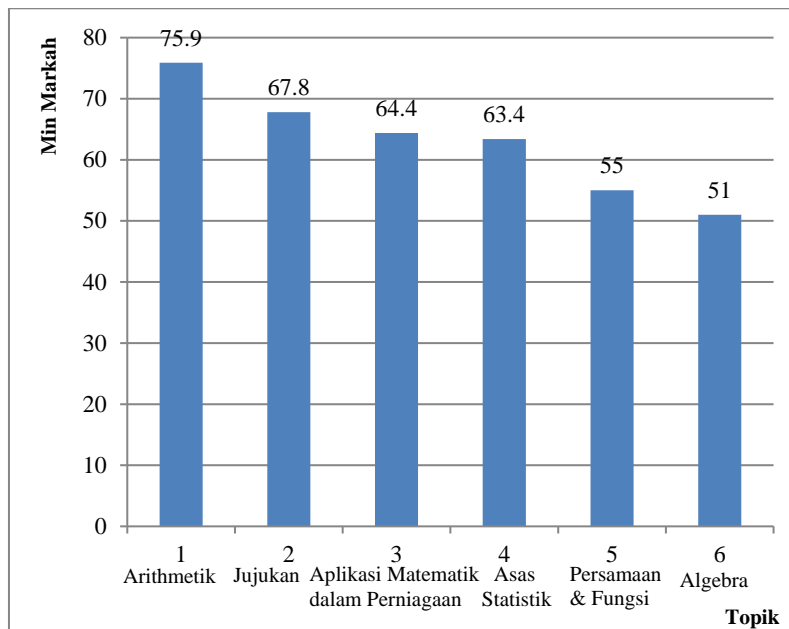
Bil. Topik	Topik	Bil. Item Soalan	Markah Penuh
1	Artihmetik	2	6
2	Algebra	3	15
3	Persamaan dan fungsi	6	18
4	Jujukan	2	10
5	Aplikasi matematik dalam perniagaan	7	41
6	Asas statistik	2	10

Kajian diteruskan dengan menumpu kepada soalan berkaitan dengan topik yang menjadi punca kesilapan tertinggi. Analisis data dijalankan dengan menyemak jawapan dengan teliti dan terperinci yang diberikan oleh responden iaitu dengan melihat pola kesalahan asas matematik yang dilakukan oleh pelajar pada setiap soalan dalam topik spesifik tersebut. Markah akan diberi berdasarkan kaedah yang digunakan dengan jawapan yang betul. Dengan cara ini, pengkaji akan dapat mengetahui jenis kesilapan dan memudahkan pengesanan pelajar yang melakukan kesilapan dalam menyelesaikan soalan yang dikemukakan. Daripada skrip jawapan yang berikan pelajar, dapat dilihat pola-pola kesalahan asas matematik yang dilakukan serta analisa dibuat untuk menggambarkan tahap penguasaan pelajar samada mereka beruapaya menguasai dengan baik atau sebaliknya.

Analisa dan Perbincangan

Analisa data yang dijalankan adalah dimulakan dengan analisa deskriptif. Carta palang dalam Rajah 1 di bawah menunjukkan min markah pencapaian pelajar mengikut pembahagian topik yang diuji. Didapati bahawa topik arithmetik mencatatkan min markah jawapan betul tertinggi iaitu sebanyak 75.9%, diikuti oleh topik jujukan(67.8%), aplikasi matematik dalam perniagaan (64.4%), asas statistik (63.4%) dan persamaan dan fungsi (55%). Manakala topik algebra pula adalah yang paling rendah iaitu hanya 51%. Analisis terhadap skor markah menunjukkan pelajar tidak dapat menguasai topik Algebra dengan baik dan mereka juga mendapat skor markah terendah kedua iaitu dalam topik persamaan dan fungsi. Keadaan ini kerana kedua-dua topik tersebut menghendaki pelajar menguasai asas Algebra

dengan baik terlebih dahulu. Dapatan ini bersesuaian dengan kajian Norshafariza (2022) kefahaman terhadap konsep asas akan menjadi penghalang untuk menguasai matematik kerana soalan yang merangkumi semua tajuk memerlukan penguasaan yang baik terhadap konsep asas.



Rajah 1: Carta Palang Min Markah Jawapan Betul Pelajar Mengikut Topik

Jadual 2 pula menunjukkan taburan pencapaian skor markah pelajar mengikut kategori topik. Didapati terdapat perbezaan yang ketara antara pencapaian skor markah pelajar cemerlang dan lemah. Perbezaan yang amat ketara antara pelajar cemerlang dan lemah adalah pelajar cemerlang dengan pencapaian 100% skor markah dalam semua topik kecuali 93.3% skor markah dalam topik Algebra. Manakala pelajar lemah dengan skor markah paling rendah iaitu 3.6% dalam topik Algebra. Analisa ini menunjukkan pelajar lemah tidak menguasai hampir keseluruhan topik. Pelajar yang memperolehi skor markah yang maksimum menunjukkan tahap penguasaan dan kefahaman mereka dalam kursus Matematik Intensif ini adalah sangat baik. Namun begitu, didapati bahawa pelajar yang lemah tidak boleh menguasai konsep asas dengan baik sungguhpun tajuk berkenaan adalah tajuk-tajuk asas yang perlu dipelajari.

Jadual 2: Taburan Pencapaian Skor Markah Pelajar Mengikut Kategori Topik

Topik	Markah Penuh	Maksimum Skor Markah	Minimum Skor Markah
Arithmetik	6	6(100%)	1(16.7%)
Algebra	15	14(93.3%)	0.5(3.6%)
Persamaan dan Fungsi	18	18(100%)	1(5.55%)
Jujukan	10	10(100%)	1(10%)
Aplikasi matematik dalam perniagaan	41	41(100%)	8(19.5%)
Asas Statistik	10	10(100%)	0.5(5%)

Seterusnya, kajian ini tertumpu kepada topik algebra kerana berdasarkan min markah yang paling rendah diperolehi dalam kursus Matematik Intensif. Analisa seterusnya dibuat untuk mengenalpasti pola-pola kesilapan yang dilakukan oleh pelajar dalam topik tersebut memandangkan topik Algebra masih belum mampu dikuasai sepenuhnya oleh pelajar berbanding topik lain. Jadual 3 menunjukkan peratusan min markah jawapan betul pelajar mengikut subtopik dalam topik Algebra. Dapat disimpulkan bahawa majoriti pelajar dapat menjawab soalan berkaitan pengembangan, namun begitu mereka masih menghadapi masalah dalam pemfaktoran dan meringkaskan jawapan dalam ungkapan pecahan algebra. Masalah ini dikesan dari semakan dokumen skrip jawapan pelajar dimana pelajar tidak mampu menjawab soalan sepenuhnya dan terdapat pelajar yang tidak menjawab soalan dari subtopik ini. Kedua-dua subtopik tersebut menunjukkan tidak sampai 50% pelajar dapat menjawab dengan baik. Secara keseluruhan, didapati bahawa kesilapan asas yang dilakukan oleh pelajar adalah kesilapan dalam pemfaktoran samada pemfaktoran tidak lengkap atau tidak menggunakan identiti untuk membuat pemfaktoran.

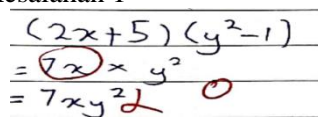
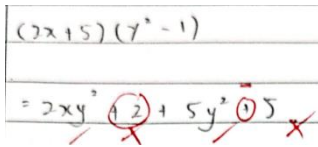
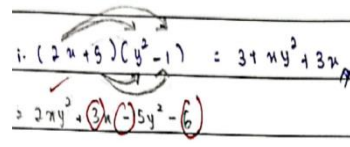
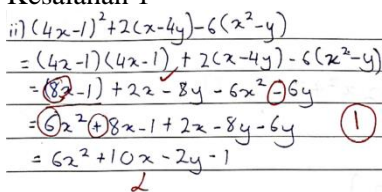
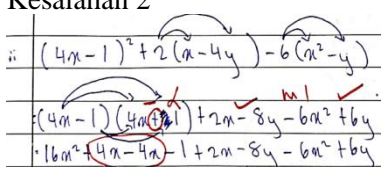
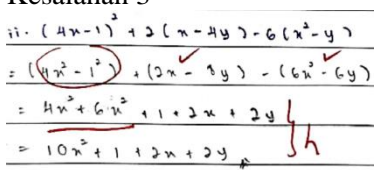
Jadual 3: Min Markah Jawapan Betul Pelajar Mengikut kategori subtopik dalam Algebra

Item Soalan	Subtopik (Algebra)	Min Markah Pelajar
1	Perkembangan ungkapan algebra	66.25%
2	Pemfaktoran lengkap dalam ungkapan algebra	45.4%
3	Permudahkan ungkapan pecahan algebra	38.7%

Huraian setiap item soalan peperiksaan penilaian akhir semester bersama dengan sampel jawapan pelajar bagi melihat pola kesalahan yang dilakukan oleh pelajar dalam topik Algebra disertakan bersama dalam Jadual 4. Antara pola kesalahan yang telah dikenalpasti dilakukan pelajar dalam topik

Algebra adalah disebabkan pelajar menggunakan kaedah yang salah, tidak mempermudah jawapan akhir, kesalahan tanda positif dan negatif, cuai dalam pengiraan dan cuai menyalin soalan yang betul serta pelajar tidak langsung menjawab soalan.

Jadual 4: Pola Kesalahan Pelajar dalam Topik Algebra

Item soalan 1 (Pengembangan)	Jawapan Pelajar	Penerangan
<p>Simplify the following expression:</p> <p>i) $(2x+5)(y^2-1)$.</p> <p>Jawapan betul</p> <p>$= 2xy^2 + 5y^2 - 2x - 5$</p>	<p>Kesalahan 1</p>  <p>Kesalahan 2</p>  <p>Kesalahan 3</p> 	<p>Pelajar melakukan pengembangan yang salah. Pelajar tidak faham kaedah kembangan diantara dua ungkapan algebra.</p> <p>Pelajar melakukan kesalahan tanda dalam operasi pendaraban nombor negatif.</p> <p>Pelajar faham untuk melakukan pengembangan tetapi melakukan kesalahan dari segi tanda dan kesalahan meringkaskan jawapan akhir.</p>
<p>ii) $(4x-1)^2 + 2(x-4y) - 6(x^2-y)$.</p> <p>Jawapan betul</p> <p>$= (4x-1)(4x-1) + 2x - 8y - 6x^2 + 6y$</p> <p>$= 16x^2 - 4x - 4x + 1 + 2x - 8y - 6x^2 + 6y$</p> <p>$= 10x^2 - 6x - 2y + 1$</p>	<p>Kesalahan 1</p>  <p>Kesalahan 2</p>  <p>Kesalahan 3</p> 	<p>Kecuaian pelajar tertinggal kuasa dua pada kembangan bahagian pertama.</p> <p>Bagi ungkapan dalam kurungan kuasa dua, pelajar salah konsep meletakkan tanda berbeza pada salah satu ungkapan algebra. Sepatutnya dua ungkapan algebra adalah sama tanda.</p> <p>Pelajar tidak mengembangan ungkapan dalam kurungan kuasa dua tetapi meletakkan kuasa dua bagi sebutan yang berada di dalam kurungan.</p>

Item soalan 2 (Pemfaktoran)	Jawapan Pelajar	Penerangan						
<p>Factorize the following expressions completely:</p> <p>i) $125y^5 + 25y^3$.</p> <p>Jawapan betul</p> <p>$= 25y^3 (5y^2+1)$</p>	<p>Kesalahan 1</p> $\frac{125y^5 + 25y^3}{(5^3 y^5) + (5^2 y^3)}$ $\frac{(5^3 + 5^2)(y^5 + y^3)}{(5^3 + 5^2)(y^5 + y^3)}$ <p>Kesalahan 2</p> $1) 125y^5 + 25y^3$ <hr/> $5y(5y^4 + 1y^3)$ <p>Kesalahan 3</p> $\frac{125y^5 + 25y^3}{5^3 + 5^2 = 150}$	<p>Pelajar tidak faham konsep pemfaktoran. Pelajar telah menggunakan kaedah yang salah dengan mengasingkan antara sebutan dan anu.</p> <p>Pelajar tidak memfaktorkan secara lengkap bagi kedua-dua anu dan sebutan.</p> <p>Pelajar tidak memahami kehendak soalan.</p>						
<p>ii) $121a^2 - 36b^4$.</p> <p>Jawapan betul</p> <p>$121a^2 - 36b^4$</p> <p>$= 11^2a^2 - (6b^2)^2$</p> <p>$= (11a - 6b^2)(11a + 6b^2)$</p>	<p>Kesalahan 1</p> $\frac{121a^2 - 36b^4}{= 85a^2 - b^4}$ <p>Kesalahan 2</p> $\frac{121a^2 - 36b^4}{11^2a^2 - 6^2b^4}$ $= \frac{(11a)^2 - (6b^2)^2}{?}$ <p>Kesalahan 3</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>a</td> <td>$121a^2 - 36b^4$</td> </tr> <tr> <td>b</td> <td>$121a - 36b^4$</td> </tr> <tr> <td></td> <td>$121a - 36b^3$</td> </tr> </table> $ab(121a - 36b^3)$	a	$121a^2 - 36b^4$	b	$121a - 36b^4$		$121a - 36b^3$	<p>Pelajar tidak memahami kehendak soalan dengan melakukan operasi penolakan diantara sebutan sahaja.</p> <p>Pelajar tidak menggunakan identiti dalam pemfaktoran bagi beza antara dua sebutan kuasa dua.</p> <p>Pelajar menggunakan kaedah pemfaktoran yang salah dan tidak boleh membezakan faktor sebutan terbesar sepunya bagi kedua-dua sebutan dan anu.</p>
a	$121a^2 - 36b^4$							
b	$121a - 36b^4$							
	$121a - 36b^3$							
<p>iii) $16m^3n^2p^5 - 24m^2n^2p^4 + 8m^4n^5p^3$.</p> <p>Jawapan betul</p> <p>$16m^3n^2p^5 - 24m^2n^2p^4 + 8m^4n^5p^3$</p> <p>$= 8m^2n^2p^3(2mp^2 - 3p + m^2n^3)$</p>	<p>Kesalahan 1</p> $= 8mnp(2m^2np^4 - 3mnp^3 + 1m^3n^4p^2)$ <p>Kesalahan 2</p> $\frac{16m^3n^2p^5 - 24m^2n^2p^4 + 8m^4n^5p^3}{4m^2n^2p^3(4mp^2 - 6p + 2m^2n^3)}$ <p>Kesalahan 3</p> $\frac{(iii) 24m^3n^2p^4 + 8m^4n^5p^3 - 16m^3n^2p^5}{= 32 - 16}$ $= 16m^6n^5p^7$ $= 16m^3n^5p^2 \quad \times \quad 0$	<p>Pelajar tidak melakukan pemfaktoran tidak lengkap.</p> <p>Jawapan pelajar betul tetapi untuk pemfaktoran sepunya terbesar tidak lengkap.</p> <p>Pelajar tidak memahami kehendak soalan dan mencipta hukum ungkapan algebra sendiri.</p>						

Item soalan 3 (Ungkapan Pecahan Algebra)	Jawapan Pelajar	Penerangan
Simplify $\frac{x^2+3x-4}{x^2+x-2} \times \frac{2x+4}{2x^2-32}$. Jawapan Betul $\frac{x^2+3x-4}{x^2+x-2} \times \frac{2x+4}{2x^2-32}$ $= \frac{(x-1)(x+4)}{(x-1)(x+2)} \times \frac{2(x+2)}{2(x-4)(x+4)}$ $= \frac{1}{x-4}$	Kesalahan 1 $\frac{x^2+3x-4}{x^2+x-2} \times \frac{2x+4}{2x^2-32}$ $\frac{3x-4}{x-2} \times \frac{2x+4}{2x^2-32}$ $\frac{3x+2x}{x-2+2x^2-32}$ Kesalahan 2 $\frac{x^2+3x-4}{x^2+x-2} \times \frac{2x+4}{2x^2-32}$ $\frac{(x-1)(x+4)}{(x-1)(x+2)} \times \frac{2(x+2)}{2(x-4)(x+4)}$ $= \frac{1}{x-4}$ Kesalahan 3 $\frac{x^2+3x-4}{x^2+x-2} \times \frac{2x+4}{2x^2-32}$ $= \frac{(x-1)(x+4)}{(x-1)(x+2)} \times \frac{2(x+2)}{2(x-4)(x+4)}$ $= \frac{1}{x-4}$	Pelajar tidak faham konsep penghapusan serta hukum matematik dengan mencipta konsep pemotongan sendiri. Pelajar menjawab dengan betul tetapi kecuaiian pelajar tidak memberi jawapan dalam bentuk satu pecahan. Pelajar tidak memfaktorkan faktor sepunya terbesar secara lengkap pada bahagian penyebut pecahan bahagian dua.

Kesimpulan

Berdasarkan kajian ini, boleh disimpulkan bahawa topik Algebra merupakan topik spesifik yang mendapat skor markah yang kurang memuaskan berbanding topik yang lain mengikut silibus kursus Matematik Intensif. Dapatan kajian menunjukkan tumpuan utama perlu diberikan pada topik Algebra dan terdapat pola kesalahan yang dilakukan oleh pelajar dalam topik Algebra tersebut dikenalpasti. Didapati pola kesalahan pelajar dalam menggunakan teknik penghapusan bagi mempermudah ungkapan pecahan Algebra menyumbang kepada skor markah terendah. Kesilapan mereka adalah mereka tidak penyelesaian pemfaktoran Algebra diantara pengangka dan penyebut terlebih dahulu dan seterusnya membina kefahaman yang salah dalama teknik penghapusan tanpa mengetahui jawapan yang diberi tidak relevan.

Dengan mengenalpasti topik spesifik yang menjadi punca kesilapan pelajar dapat memberi gambaran awal kepada para pensyarah tentang tahap penguasaan dan kefahaman matematik dikalangan pelajar pra diploma dalam subjek matematik sebelum mereka meneruskan pengajian ke peringkat diploma. Dengan itu pensyarah perlu menambahbaik proses pengajaran dan pembelajaran, merancang pendekatan yang sesuai untuk membantu pelajar dan boleh dijadikan sebagai penanda aras untuk

mencari penyelesaian kepada masalah ini. Oleh itu, pelbagai inisiatif perlu dilakukan oleh pensyarah supaya lebih memberi tumpuan ketika menjawab soalan melibatkan asas matematik terutama Algebra. Sepertimana menurut Sollelah dalam kajian yang dijalankan oleh Maisurah (2021), proses metakognitif secara tidak langsung boleh membantu seseorang pelajar dalam meningkatkan pembelajaran dengan cara membimbing pelajar itu berfikir. Pelajar dibantu dengan menentukan langkah kerja yang perlu diambil apabila pelajar tersebut berusaha memahami situasi, menyelesaikan masalah dan membuat keputusan.

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TeKnow: A KNOWLEDGEABLE GAME FOR KIDS

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ABSTRACT

In the era of technology and globalization, teaching and learning has play an important role in human life especially when involving the new generations. To make teaching and learning more interesting, new attempt have been made by introducing gaming concepts to students. During recent years, more classical concepts are being introduced in teaching and learning by using board games. Thus, TeKnow was being developed to test students' knowledge and understanding while playing games. TeKnow was inspired by the Snakes and Ladders game. It was specifically designed for school students from different ages. Simple questions on English will be asked to increase students' knowledge on vocabulary and spelling according to different level of difficulties. Through this game, player do not only have fun but at the same time they can learn to test their knowledge on spelling and vocabulary. Besides that, students have to take turns to express their ideas according to the instructions given. This game is hoped to help teachers and students in teaching and learning especially to develop students social skills and increase understanding and flexibility in their studies.

Keywords: board games, knowledge, spelling, vocabulary, understanding

Introduction

Game based learning has transformed the traditional method of transmitting knowledge. The incorporation of games in learning triggers pupils to be autonomous learners and enhances their learning in various fields of knowledge (Fatin et al, 2019). Undeniably, games help to lower students' anxieties and create contexts in which students can collaborate with peers in teams to use language meaningfully and in a relaxed way (Wong and Melor, 2021).

Board games are important to provide hands-on and heads-on skill, and knowledge development for people of all ages in any subjects besides providing a nonthreatening, playful, yet competitive environment in which to focus on content and reinforce and apply learning (Treher, 2011). Board games allow players to move counters or pieces in particular ways on a board, according to a set of rules. It can be classified into classic games, family games, strategy games, thematic games and war games (Wong and Melor, 2021). There are several famous board games such as chess, Monopoly, and Snakes and Ladders. InCes (Infiniti Cergas Sihat) is also a board game developed to be used as an intermediate medium for teaching while playing. In addition, InCeS also implement exercise activities as an intermediary game instrument to promote healthy physical activity (Siti Nurleena et al, 2022).

Playing board games can help to enhance students' skills and development (Surajwaran & Azlina, 2019). Through board games, students are exposed to ideas and opinions given by their peers (Barton et al, 2018). Hence, board games are recognized as perfect learning tools as they equip children with new knowledge while also entertaining them. Since most students have interest in games, they will be more determined and very interested to play the game and at the same time they get knowledge from it. Whereas some board games imitate real-life circumstances, this can help students to develop social skills and increase their flexibility.

Materials and Method

Materials

TeKnow is a board game inspired by the Snakes and Ladders game. Snakes and Ladders is a board game where it can be played by two or more players. It is played on a game board normally with the size of 8×8, 10×10 or 12×12 numbered, gridded squares. Few "ladders" and "snakes" are pictured on the board, each connecting two specific board squares (Wikipedia, n.d.). When the players land on the ladders, they can move to the square which the ladder reach on top but if the player land on the snake, it shows that they are bitten, and they need to go down to the square that ends with the snake tail. To move from one square to another square, the player should roll a die. Other games which are similar to Snakes and Ladders are Chutes and Ladders, Bible Ups and Downs, etc.

Compared to the existing game, TeKnow was being developed slightly different in a unique way. This game consists of a 10x10 feet colorful board with playground design made with canvas materials. On the board, instead of using gridded squares, they are represented by a curve design similar like a snake body from the start until the end of the game. The curve line is separated into 50 spaces with a letter on it. Instead of snake and ladder, TeKnow uses ropes and ladders on the board. TeKnow also consists of a large die, a guideline card for the instructor and few cards which consists of questions on spelling and vocabulary for the instructor to refer. Each card was printed on a laminated A5 thick paper size. Figure 1.1 show the design of the TeKnow board while Figure 1.2 shows the design for the guidelines card.



Figure 1.1 TeKnow board design



Figure 1.2 TeKnow design for guidelines card

TeKnow was specifically designed for school students from different ages. Simple questions on English will be asked to increase students’ knowledge on vocabulary and spelling according to different level of difficulties. Through this game, player do not only can have fun but at the same time they can learn to test their knowledge on vocabulary and spelling. Figure 1.3 shows the design of the question cards to test the student’s vocabulary on fruits, vegetables and parts of bodies besides testing the students spelling in different level of difficulties based on categories such as occupations, things and animals.

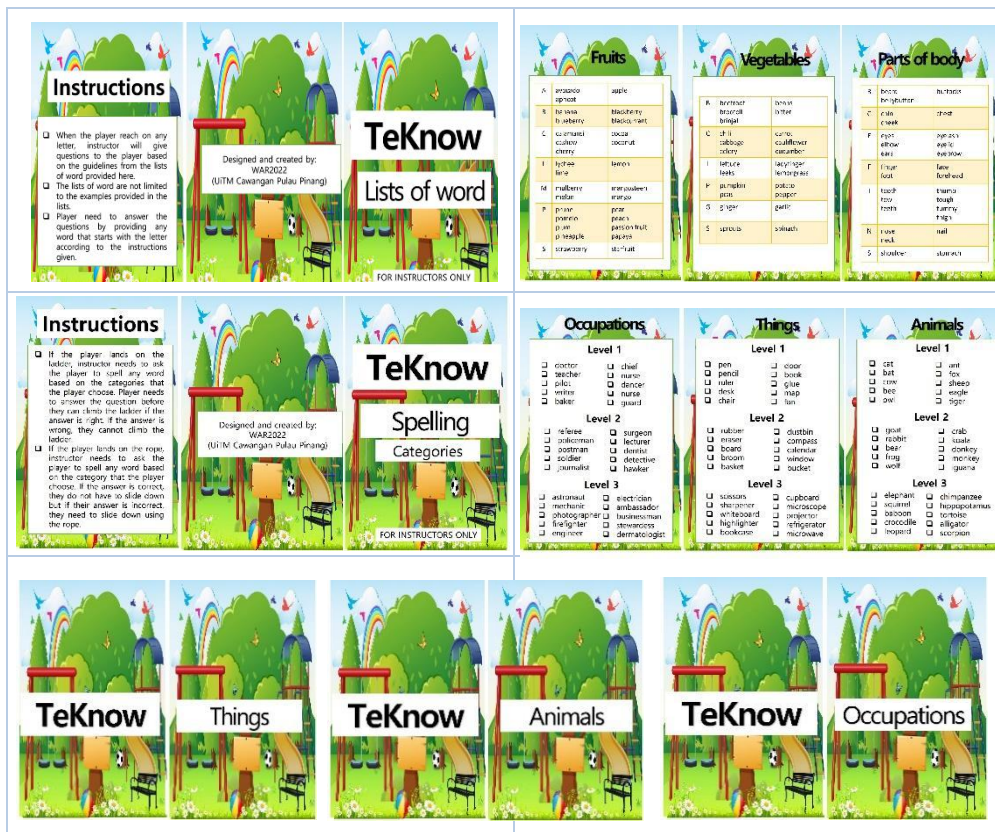


Figure 1.3 Question cards for instructor to test students with different level of difficulties

Eventhough the TeKnow board was quite big, but it can be folded easily and nicely after it is being used as it uses the canvas materials. Besides that, TeKnow cards are place in a nice box. The die provided with the game are large with sponge material. An A3 size jute bag printed with the word TeKnow will store all the TeKnow items. Figure 1.4 shows all the TeKnow items.



Figure 1.4 TeKnow items

Methods

TeKnow is a large board game designed for students from different ages. This game can be played with a maximum number of 5 players and 1 instructor. Simple questions on English will be asked to increase students knowledge on vocabulary and spelling according to different level of difficulties. A die will be included in this game. Player needs to step on the board to move from one space to another space.

Each player will roll a die to determine their turn. To start moving, player will roll a die. The number on the dice will determine the steps to move. When the player comes across any letter, they need to provide any word that starts with the letter according to fruits, vegetables and parts of body given by the instructor.

If the player lands on the ladder, they need to answer a question before they can climb the ladder if the answer is right. If the answer is wrong, they cannot climb the ladder. If the player lands on the rope, they need to answer a question. If the answer is correct, they do not have to slide down but if their answer is incorrect, they need to slide down using the rope. Players who roll six can move and can role the die again.

The first person to reach the last space (the net) wins. If the player rolls too high, they will be bounced of the last space and moves backward. They can only win by rolling the exact number needed to land on the last space. The game will be continued until there is only one player left. Figure 1.5 below shows the flowchart to play the game.

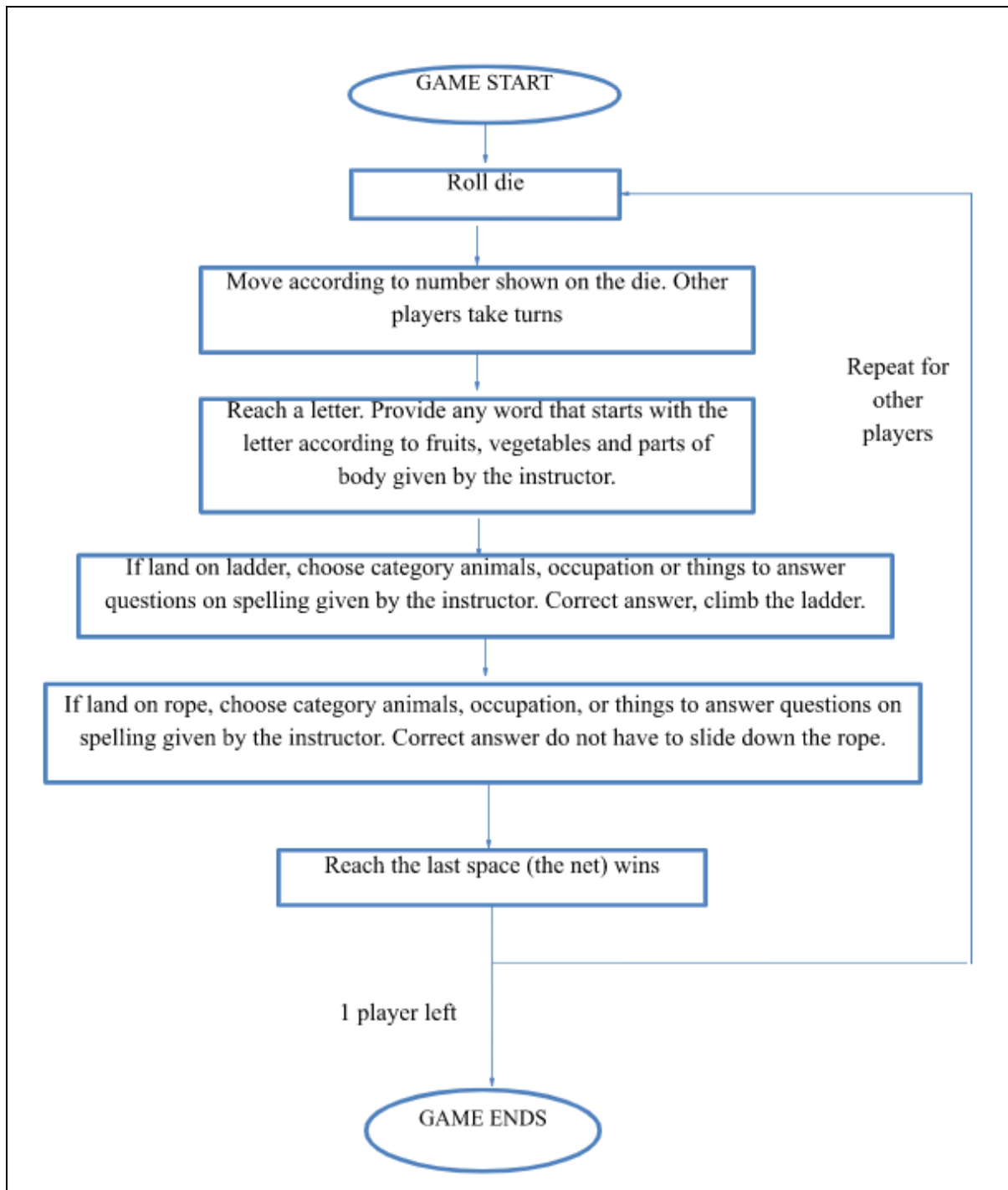


Figure 1.5 Flow of TeKnow game

Results and Discussions

This paper is to identify TeKnow as a knowledgeable game for kids. TeKnow has been implemented for around 30 disable students from SMK Tasek Gelugor, Pulau Pinang. A survey has been conducted to the teachers in charged based on the student’s contribution during the game implementation. Figure 1.6 shows the implementation of TeKnow to disable students from SMK Tasek Gelugor.



Figure 1.6 The implementation of TeKnow to disable students from SMK Tasek Gelugor.

The findings are represented in the charts below. Figure 1.7 shows the student’s interest and happiness when playing TeKnow. All students contributed very well when playing TeKnow as they feel interested and happy since TeKnow is a very interesting game and they enjoy it very well even though they have some disabilities.

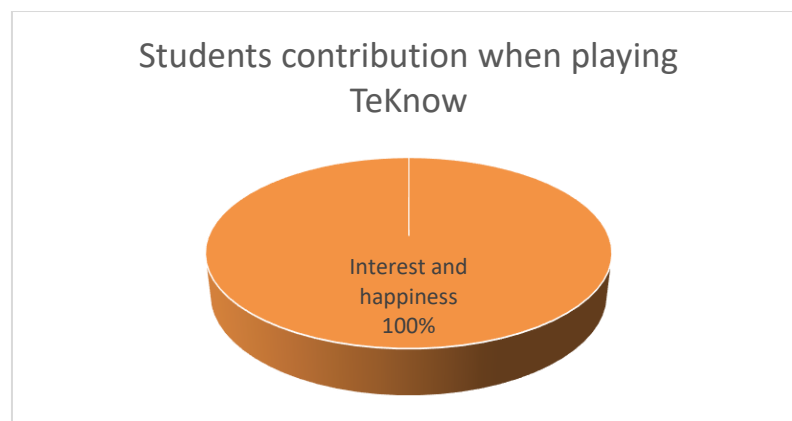


Figure 1.7 Student’s contribution when playing TeKnow.

Conclusion

TeKnow was developed to help teachers and students in teaching and learning specially to develop students' social skills and increase understanding and flexibility in their studies. This game allows students to learn English in terms of vocabulary and spelling with different level of difficulties. Through this game, player do not only have fun but at the same time they can learn to test their knowledge in an enjoyable way. Besides that, students can take turns to express their ideas according to the instructions given. It is hope in the future, this game can be extended to other subjects and topics so that teachers and students will have varieties of approaches in teaching and learning interestingly.

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SnAP Edu: LEARN WHILE PLAYING

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ABSTRACT

SnAP Edu is card game that create as a new tactic of learning in an interesting way thru playing. As in the era of internet and globalization, teacher and student must explore many other approaches in studying and doing revisions that up to trends. Learning and revision process using gaming will increase the student understanding. This card game are created to help student to do learning and revision process interesting and enjoyable. SnAP Edu game card can be used to any level of education either for schools or higher-level institution. This card game is design to be played from 2 to maximum of 6 players. The design of these cards is colorful and using flower images. The players have to answer question asked based on the same card that been snapped. The winner in the game calculated based on the large number of card s collected. The question asked are based on the topic selected before the game starts. A group of around 30 students from standard 3 to 5 are used as sample of respondents for these studies. The result shows the players felt enjoy, interesting and easy to do revision while playing this SnAP Edu card game.

Keywords: *card game, gamming, stem education, education game, study approach*

Introductions

Wikipedia define a card game is any game that uses playing cards as the primary device with which it is played, whether traditional or specific game style. Card game can be played by minimum of 2 players to maximum of 8 players. There are many types of card game available in market like Happy Family, Poker Card, Snap Family Fantasy and many mores. This study introduces SnAP Edu card game that combine the technique of playing and learning process.

SnAP Edu card game is a learning game card. This card can help the school student in process learning and doing revisions. Any level of age student can play this SnAP Edu card. SnAP Edu card is played individually with overlook by instructor. Exercise questions from topic Science & Science Technology will be asked during the game. Actually, this approach revision during playing will encourage student and enhance the student interest in the topic discuss.

In current education system thought have held that education is an organic process that cannot be imposed through drilling. Many teachers are concerned that students do not allocate enough time to independent thinking, group discussions, or active learning. Individuals are more likely to learn when they learn with others rather than alone (Michael and Chen, 2006).

According to Ritzko and Robinson (2006), games have a significant relationship with interest and enthusiasm among business students using an active learning approach. According to those studies, the most recent types of respondents from undergraduate college students are the generation that has grown up with TV game shows, interactive video games, and the Internet as forms of entertainment and education. A traditional lecture class appears to be unpopular in comparison to these latest interactive mediums. In-class games are one way to increase student engagement with the class and relevant material.

Many people enjoy mobile games because they can be played at any time and from any location. Prato et al says, according to their findings, this game is very entertaining, interesting, and simple to play, and it improves problem-solving and decision-making skills. A type of flash card that can fulfil the basic elements of an active teaching and learning approach by incorporating elements of speaking, listening, and reading activities all at once (Fakrulhazri at al, 2018).

Paramjit et al (2021) said, the most obvious manifestation of the 'joy of learning' is intrinsic motivation, which leads to a desire for more of it. When students are involved and engaged in play, they are more motivated to learn. Nurturing joy in this way is extremely rewarding and results in a very pleasant environment, because students naturally participate more when they enjoy what they do.

There in a previous studies, the researchers (R.Gurbz & E.Erdem, 2018) have say that engagement is re is a requirement for meaningful learning to occur, which necessitates a shift in student's behavioural patterns from 'passive vessels' to 'active participants'. Such modes of learning, once combined, result in a more in-depth learning experience that students can relate to each other's.

The amount of effort put into creating or constructing a game should not impede the learning process or add additional burden to the learners. Clark (2013) criticises the digital version of Concentration, one of the existing online vocabulary games. There are 16 cards face down on the screen in the game, and learners must find the matched pairs of eight vocabulary words. The students will keep clicking until they find the perfect match. When a match is found,

the pair is eliminated. Clark (2013) contends that having to recall the location of the cards before getting the correct match adds an extra burden to vocabulary learners; thus, this activity is highly irrelevant to vocabulary learning.

Materials and Method

Method

In the process of developing SnAP Edu card there two (2) main method applied. First method is for design then the second method are to study the satisfaction of using SnAP Edu card. In this part the 1st method will be elaborate while the 2nd method will be discussed further in part result and discussion.

SnAP Edu card has been developed based on Program Development Life Cycle (PDLC) steps as shown in Figure 1. There are five main steps in PDLC that start with analysis, design, implementation, testing and documentation.

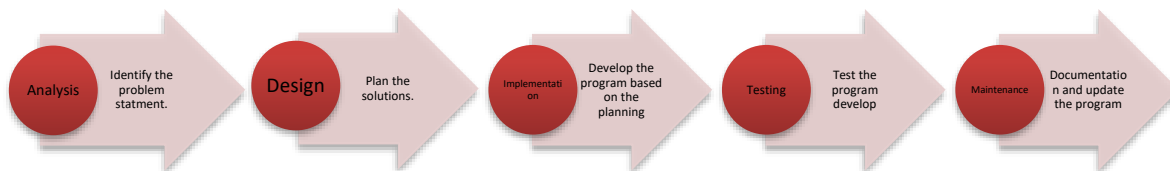


Figure 1: PDLC design

Initially before the project SnAP Edu Card was developed, the problem statement was identified. The main problem is students felt bored performing revision in traditional way. So once, clearly understand the requirements to solve the problem, next step are proceed. Next in the design level, interface design for the card was developed differently from common design available. Once finalized the design for the card , it was sent to print as the quality of flash card available with different size. A list of questions is prepared and also printed in different card that will be packed together with SnAP Edu card. Once the SnAP carad are ready, it is used in some education training to test the satisfaction and effectiveness.

Materials

SnAP Edu is a card game inspired from Snap Family Fantasy game. SnAP Edu, it is designed with floral concepts. SnAP Edu was being developed slightly different in a unique way. The card size for the SnAP Edu is 12 cm X 15 cm. The figure 1 and 2 below shows the interface design for SnAp Edu with front view and back view. The figure 3 show the interface of the questions ask are in the game.

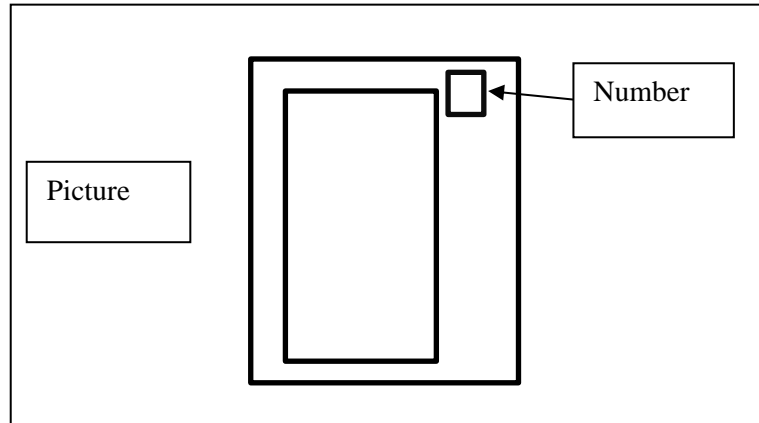


Figure 2: SnAP Edu card interface design (front view)

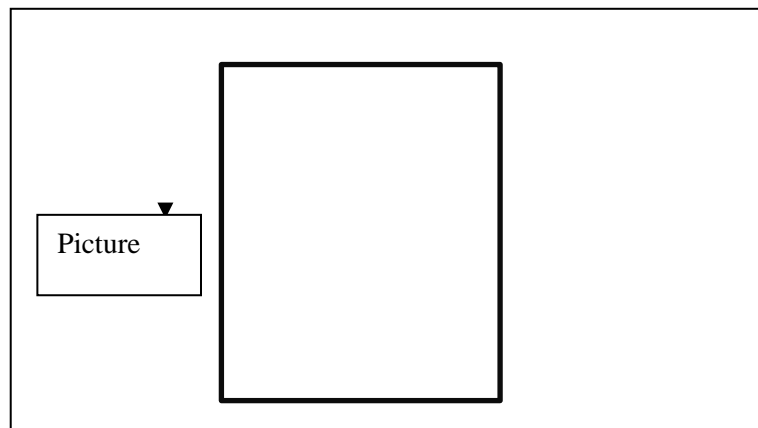


Figure 3: SnAP Edu card interface design (back view)

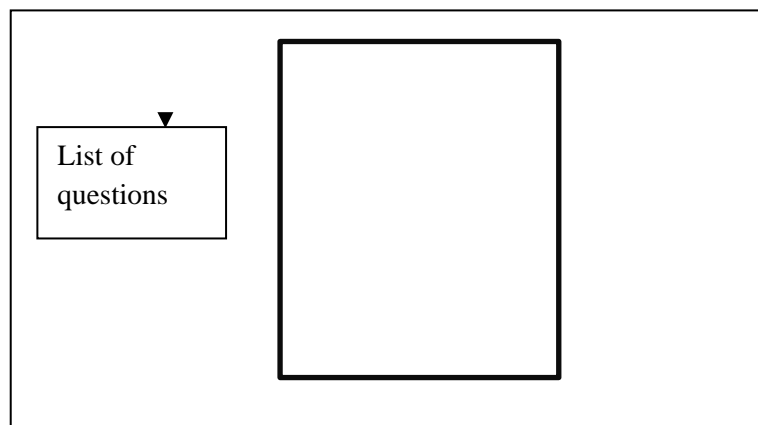


Figure 3: SnAP Edu card interface design (question card)

Methods

SnAP Edu is card game, whereby can be played in individually by maximum of 5 players from different ages. This game can be played with a maximum number of 5 players and 1 instructor. Simple questions on English will be asked to increase students' knowledge according to different level of difficulties.

As usual, the game start with a player to the dealer's left turns over the top card of his pile and places it face up, beginning a pile of cards next to their face down cards. The player to the left follows suit, and so on around the table.

When a card is turned up that matches a card already face up on another player's pile, the first person to notice the two matched cards calls out "Snap!" and wins both piles. To keep the piles the player wins, the player has to answer the question asked by the instructor. If the player answers correctly then the player can keep the piles if not the player can't keep it. The cards are added to the bottom of this player's face-down pile. The winner of the game can be define based on the card the player collects at the end of the game. If we have same number of cards they have to answers a questions to find a winner. Figure 4 below show the flow how the game is played.

Results And Discussion

A survey has been conducted among 30 students. The main objective of the questionnaire is to identify the student's opinion and satisfaction using SnAP Edu. The questions are divided in two parts which are:

- a) Demographic
 - Gender
 - Age
- b) SnAP Edu satisfaction

Below are the results and findings from the questionnaire distributed among the students. The table above shows the demographic information about the respondent. From the 30 students involved in this study, 14 of them are female student while 16 of the are male student as shown in Table 1. Table 2 shows there are 7 male and female students from age between 10 to 12 years old meanwhile there are 7 female and 9 male student in age of 9 to 10 years old.

Table 1: Respondent Demographic based on gender

Gender	Male	Female
Number of students	16	14

Table 2: Respondent Demographic based on age

Gender	Male	Female
Age between 11 to12	7	7
Age between 9 to11	9	7

Figure 4 illustrates the respondent’s satisfaction in using SnAP Edu. The result shows, 95% of the respondents are satisfied with SnAP Edu card game as it can help and make them enjoy during their revision time.

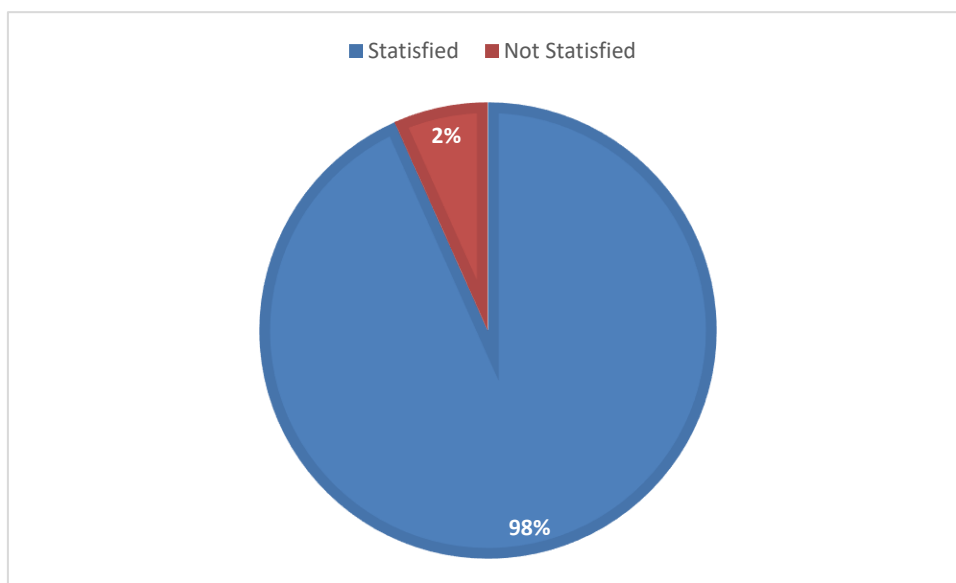


Figure 4: Student’s level of satisfaction using SnAP Edu

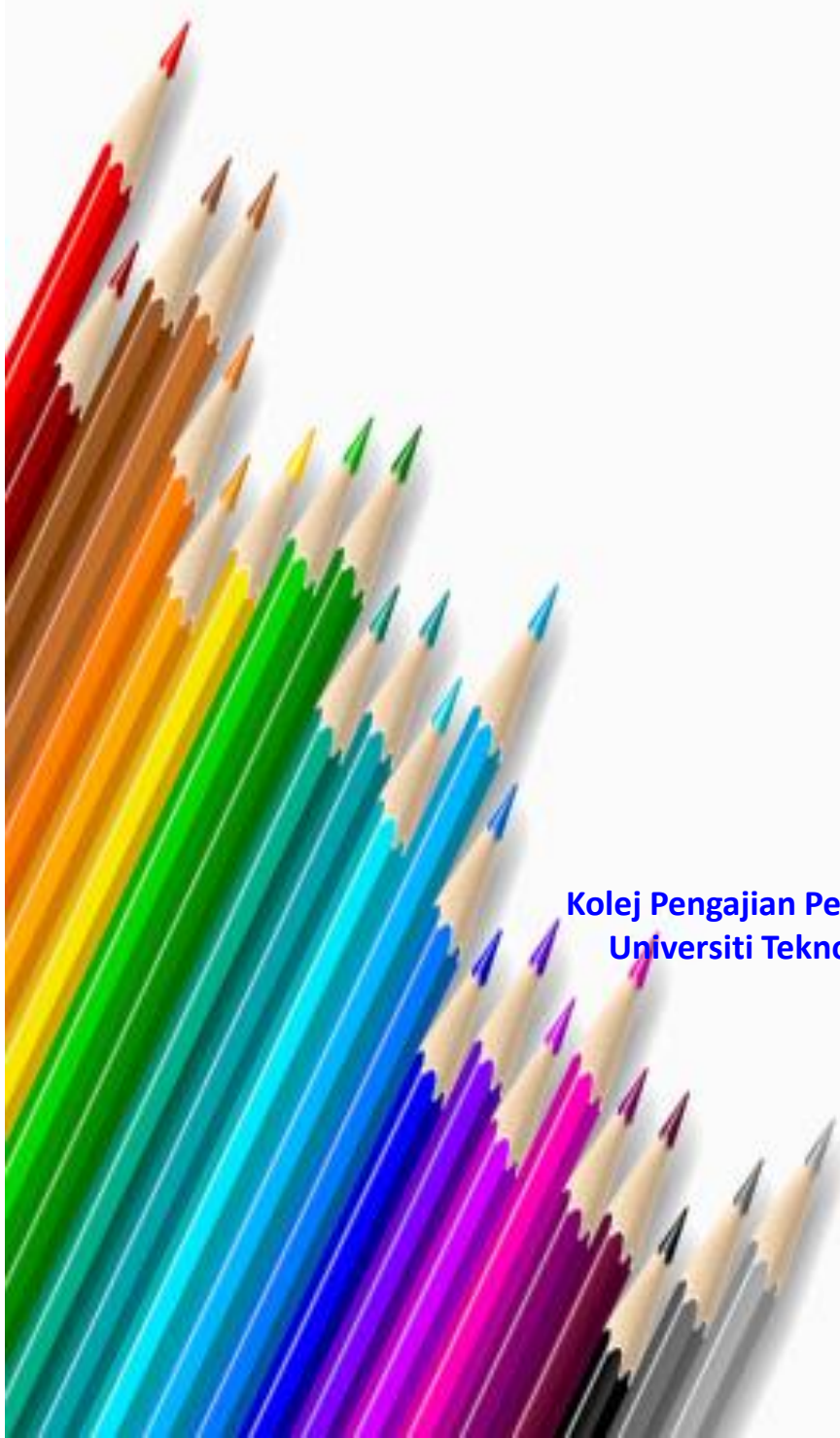
Conclusion

As a result, learners become more focused and willing to devote significant time to improving their game performance. Various studies have shown that engaging learners through guided play produces better results in pedagogical practises than the traditional teaching method. SnAP Edu also have proven that players satisfied to play the card while doing the revisions.

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