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BENEFITS OF CO-CURRICULAR ACTIVITIES AMONGST STUDENTS

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ABSTRACT–Co-curricular activities play an important role in developing soft skills and assist students towards success. Active participation in co-curricular activities has positive effects towards their success; let it be academic achievement, character, and skills development. These activities will help students to develop their essential skills, self-confidence and self-esteem. As well as students' healthy personality development, improve in disciplinary, in calculating moral values, better social interaction and contribute efforts to the community while maintaining their academic performances. Through co-curricular activities, students will gain extra skills in life such as communication skills, critical thinking and problem-solving skills, team working skills, leadership skills and other skills which will help them in career prospects. The school and university seem like a logical and convenient platform for students to experience these skills through cocurricular activities. This paper discusses the benefits of students' involvement in cocurricular activities in the aspects of leadership, personality development, teamwork, communication, and critical thinking.

Keywords: co-curricular, benefits, students

1. INTRODUCTION

In 2018, UTM has launched their foundation programme for SPM leavers. This programme offers a direct entry to Universiti Teknologi Malaysia (UTM). In order to produce quality graduates, UTM has long initiated the execution of holistic student development through involvement in co-curricular activities. According to [1], students must not only master knowledge for subjects that have been offered to them in class, but they must also be exposed to other types of skills and attributes of a graduate outside of class. UTM Foundation Program is a one-year full time program. The students must attend lectures, complete assignments, and undergo periodical tests and end-of-semester examinations, similar to their counterparts in other pre-university education pathways. Their schedule is quite packed; however, this does not limit our students to partake in extra activities.

Some of our foundation students involved with co-curricular activities provided by UTM, such as rugby, futsal, ping pong and debate club. This shows, that foundation students' needs extra activities outside their normal classroom. However, little is known about their involvement in co-curricular activities provided by the university unless our students informed their respective lecturers through exempt letters or through their academic advisors. Therefore, this paper is written to discuss the benefits of co-curricular activities, in general, towards students.

Co-curricular activity refers to any activity, programme or educational experience that being taught outside of normal classroom which complement the requirements of the regular academic curriculum. Co-curricular activities are seen as the best medium to provide an effective learning experience which can be used to encourage students to participate in various activities offered by their learning institutions. Examples of co-curricular activities include sports, athletics, associations, scouts, clubs, debates, and volunteerism. These activities help mould students into well-round people with balanced personality development: mentally, physically, socially, morally, and emotionally [1]. These developments are in line with National Education Philosophy goals: fostering holistic development of individual's potential through creating a harmonious and balanced human intellectually, spiritually, emotionally and physically that is based on trust and obedience to God [2]. This philosophy aims to develop a student that is knowledgeable, skilled, virtuous, responsible, able to achieve personal well-being and contribute to the harmony and prosperity of the society and country [3].

Numerous studies have reported that there are many beneficial impacts of co-curricular activities in schools or university on students' performance. The benefits commonly include better academic performance, positive behaviour, positive character development, and better social interaction. Students who pursued their co-curricular activities tend to perform better in their studies and score better grades [4]. According to [5], students perform well because they know how to balance their co-curricular activities and academic matter, as well as how to prioritize and manage their time effectively. In addition, through co-curricular activities, students will learn the importance of persistence, motivation, focus and hard work to achieve a desired outcome. Their mindset gets stimulated, which will then help them to concentrate in the class.

Furthermore, participation in co-curricular activities teaches them about long term commitments and sense of responsibility to perform given tasks correctly [5]. Co-curricular activities increase the students' positive behaviour and encourage them to be more discipline and are less likely to misbehave or get engaged in delinquent

acts. Students who participate in regular organised activities are willing to attend school more regularly which leads to a decline in absenteeism rate [6]. Interesting and fun activities will attract students' interest to participate and develop positive viewpoints towards co-curricular activities, thus attract students to participate and eventually reduce the school dropout rate. Co-curricular activities may lead to a decrease in academic stress and tension, which are beneficial for students' physical fitness as well as mental health. Ultimately leads to an increase in productivity in their learning.

Participation in co-curricular activities afford the opportunity for students to learn soft skills such as leadership, communication skill, team skill, problem-solving skill and other skills that required by the industry. One of the researchers, [7] found that students in the higher institution use co-curricular as the platform to enhance self- confidence, teamwork, develop communication skills and creating a better intercommunication. Participating in co-curriculum activities helps the students to boost their self-esteem and build solid character traits and leadership skills [5]. These skills are highly relevant to students in the future, especially when they start seeking jobs after graduation [8]. Therefore, the learning institutions should take proactive steps to encourage their students to harness all these benefits through participation in co-curricular activities.

2. LITERATURE REVIEWS

2.1. Benefits of Participation in Cocurricular Activities

A co-curricular activity helps students to improve their knowledge and develop value-added skill which cannot be learned in the normal classroom. Studies have reported that co-curricular activities could benefit students. They will learn beyond what they have learned in the classroom [9]. These activities are a good way to develop social, physical and intellectual skills, moral and ethical values, personality development and character appeal that will be helpful in the holistic development of the students. All these skills will prove valuable to graduates in the future which help them to meet the job criteria set by employers due to the intense competition in the job market nowadays. Moreover, cocurricular activities is a channel that provide student with a wide range of knowledge and experience to develop and hone the potential talent, interest, and creativity of the students. There have been various literature mention benefits of students' involvement in cocurricular activities during their studies. This literature review is a survey of previous studies, which will discuss the benefits of co-curricular activities in the

aspects of leadership, personality development, teamwork, communication, and critical thinking.

2.1.1 Leadership

Leadership is fundamental to the organizational survival and plays the key factors to its success. According to [10], leadership is defined as the process of influencing the behaviour of others towards the accomplishment of goals in certain situation. In other words, leadership is the driving force that causes other to volunteer or willing to work together to achieve the goals set [8]. In educational institutions, leadership can be trained through student's participation in extracurricular activities such as uniform bodies, associations, clubs, and sports. Experiences in extracurricular activities enhance student learning experience which contributes to leadership development in undergraduate students [11]. Furthermore, involvement in associations, clubs, and outdoor recreations such as camping, hiking, and kayaking is seen as a medium to nurture leadership skills among students [12].

Previous studies have found that leadership skills can be developed through the involvement of students in co-curricular activities. Research has found that there is a significant relationship between active participation and leadership skills [13]. Due to the result of the study, an interesting module package was proposed to encourage students' involvement in co-curricular programme as a medium to foster leadership abilities. A study by [4] discovered that 88% of the students agree that extracurricular activities enhance the leadership qualities of the students. Students who participate in co-curricular activities demonstrate greater leadership skills, are more thoughtful in their ethical decisions, and able to articulate the benefits from their involvement [14].

2.1.2 Personality Development

A study conducted by [15] found that co-curricular activities have significant relationship with personality development of secondary school students. The selected personality traits involve self-confidence, honesty, adaptation, sociability, sympathetic attitude, social obligation and sense of responsibility. The study also claimed that co-curricular activities facilitate the personality development of students by making them confident, focused, interactive, extrovert and sociable. According to [16], students who participate in co-curricular activities show greater adolescents' character development especially in time management and leadership skills and more positive social development such as group activities build team-work and communication skills. Besides that, participation in co-curricular

activities builds students' self-confidence, resiliency and ability to accept constructive criticisms which contribute to character development.

One study reported that co-curricular activities increase students' self-confidence, teacher perception and developed positive connection between students and school which raised students' self-esteem and motivation [17]. Having a high level of self-esteem will create the sense of belonging to their learning environment and positive attitudes towards the school, which boost their motivation to grow academically and personally. All of these acquired skills during cocurricular activities participation then being employed in studying and taking exams as well as into their everyday lives.

2.1.3 Teamwork

Teamwork refers to the ability and willingness of a group of people to work together in a cooperative environment to accomplish a common goal. According to [18], there are several successful attributes needed for effective teamwork including the commitment to team success and shared goals, positive interdependence team, interpersonal skills such as the ability to discuss issues openly with members, be honest, trustworthy, supportive and show respect and commitment to the team, open communication and positive feedback by actively listening to the concerns and needs of team members, willing to give and receive constructive criticism, appropriate team composition where all team members need to be fully aware of their specific role and understand the team expectation and contribution from them. Teamwork is one of an important skill element in soft skills which need to be attention and mastered by students. The skill is the key success to meet the job requirements as demanded by the employers and attain jobs in future [19][20]. Most of the cocurricular activities involve group activities which help build teamwork skill, cooperation, goal setting and time management.

A study by [19] reported benefits in interpersonal and teamwork skills for individuals who involved in cocurricular activities compared to those who were not. Another study by [21] investigate the effect of cocurricular activities university students' teamwork skills and found that there was a significant correlation between cocurricular activities and the acquisition of essential teamwork skills. According to [4], 82% of the students agree that cocurricular activities enhance teamwork. Another study by [22][23] found that teamwork skills can be nurtured and instilled through students' involvement in sports such as football and hockey. These skills also help shape self-management with the values of cooperation among team members as well as being able to self-discipline especially in team sports [23].

2.1.4 Communication

Communication skills are divided into three elements, namely interpersonal communication skills, intrapersonal communication skills and non-verbal communication skills. This literature review will discuss on interpersonal communication skills only. According to [24], interpersonal communication skills including listening skills, questioning skills, speaking skills, feedback skills, language elements, changing attitudes and behaviours, appearance and non-verbal communication. A study by [25] defines communication as the process of transmitting information and common understanding from one person to another. Effective communication is very important to be practiced for better productivity because individuals interact and work together to achieve the organisation's goals. On the other hand, communication skills are one of the soft skill elements that need to be mastered by students because these skills can ensure a high degree of self-confidence among students for their successful future career after graduation [26].

Previous studies have shown that most graduates lack of communication skills and these skills need to be improved before they enter the world of work [27][28][29]. Many employers these days are progressively looking for skilled employees with good social and communication skills in addition to the competitive job market [27]. Research by [30] in their study states that cocurricular activities in university can provide environments that allows students to find different ways of interaction that will assist them with their communication skills and overcome high levels of communication apprehension. Activities such as competitions, association and club activities allow the process of communication and interaction more realistically and can also meet the value of understanding, respect for each other regardless of rank, race and religion [31]. Furthermore, participating in cocurricular activities develop beneficial skills such as positive network of friends and build relationship with supportive adults [16]. Another study by [32] emphasizes that cocurricular activities offer opportunity for students to train themselves in strengthening the interaction between students as well as developing students' communication skills. A study by [33] investigated the lecturer's perception on the integration of communication skills through cocurricular activities in Malaysian polytechnics. The study reported that the lecturers in polytechnics agree that cocurricular activities develop students' communication skills which will help them in the future career prospects.

2.1.5 Critical Thinking

One of the main factors that contribute to graduates' unemployment in Malaysia is the lack of thinking skills especially the capabilities to think critically [34]. Critical thinking skills have been recognised as an essential skill in to prepare students for facing challenges and responsibilities in life in the 21st century. According to [35] critical thinking includes the component skills of analysing arguments, making inferences using inductive or deductive reasoning, judging or evaluating, and making decisions or solving problems. Different researchers have come with different approaches to define critical thinking that reflect their respective disciplines [35]. In a study by [36], critical thinking has been defined as reasonable reflective thinking that is focused on deciding what to believe or do, while [37] mentions it as individual's ability to evaluate and analyse arguments, use inductive reasoning, recognize assumptions, and correctly deduce inferences and conclusions from data. For [38], critical thinking involves the mental processes, strategies, and representations people use to solve problems, make decisions and learn new concept. Generally, critical thinking is a higher-level thinking skill comprises of evaluating arguments or proposition and making judgments that can guide the development of beliefs and taking action [39]. On the other hand, critical thinking is a product of education, training and practice which require students to go beyond recalling or restating the available information, but to think about improving the ideas and process [35] [40] [41]. Overall, the main concept of critical thinking skills is based on making evaluation and processing the information rationally towards making a decision and need to be developed in nearly all disciplines of study [34].

These skills need to be mastered by students especially during their studies in higher education institutions. A study by [37] claimed that a primary goal of higher education is to help students develop critically thinking ability. The findings of the study indicated that students who involved in a variety of activities in clubs, organizations, peer and faculty interactions, and living on-campus may have experienced an improvement in their critical thinking ability [37]. Another study by [42] reported that the aims of co-curricular activities in Universiti Sains Malaysia (USM) are to focus on the importance of developing soft skills, physical skills and critical thinking to support a sustainable future. In [43] study, it has been highlighted that it is essential for students to involve in cocurricular activities during the college years to acquire skill sets including effective communication, creative and critical thinking skills as well as psychosocial intelligence, to improve themselves thus increasing their employability. Furthermore, [44][45] in their study state that debate is an experiential learning activity for students in high

school and universities which functions to develop skills in critical thinking, analyzing, synthesizing, and impromptu speaking.

3. CONCLUSION

Based on the review of literature, it can be concluded that students' participation in co-curricular activities have proved to be beneficial to the students in all aspects of life such as work, education, family, health, friends and community. co-curricular activities are capable of developing holistic students by equipped students with leadership and communication skills, greater personality development, teamwork and critical thinking skills. It is recommended those parents, teachers and the universities to continuously come out with more interactive ways to encourage and build these skills among students. For future studies, researchers may look into the relationship between students' performance in their studies with participation in co-curricular activities. Overall, co-curricular activities play a fundamental role in developing overall students' personality while at the same time boosting their confidence as preparation for the world of employment.

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REFERENCES

[1]. Ali, N., et al. (2018). Impact of co-curricular activities on students' academic achievement at secondary school level in southern districts of Khyber Pakhtunkhwa, Sci. Int. (Lahore), 30, 1, 63-66.

[2]. Mancha, S. A. and Ahmad, A. (2016). Co-curricular activities and its effect on social skills. In International Conference on Education and Regional Development, 774-781.

[3]. Othman, N., Musa, W. A. and Hakim, M. N. (2016). Kokurikulum di dalam system pendidikan di Malaysia: Satu tinjauan awal (Unpublished report), UTM Perdana School, UniversitiTeknologi Malaysia, Kuala Lumpur.

[4]. Rafiullah, K., Fakhar, Z. and Jehanzaib, K. (2017). Positive Impact of Extracurricular Activities on University Students in Lahore, Pakistan, International Journal of Social Sciences and Management, 4, 1, 22-31.

[5]. Banging, I. S. and Idris, M. S. (2017). Student Participation in Co-curriculum: Why it is Important?, Elixir Edu. Tech., 107, 47170-47180.

[6].Ahren, C. S. (2010). Disentangling the unique effects of co-curricular engagement on self-reported student learning outcomes, Doctoral Dissertation, Indiana University, USA.

[7].Maamor, S., Ibrahim, A. Z. and Samsi, A. (2015). Faktor Pemilihan Jenis Kokurikulum: Kajian Kes Pelajar Universiti Utara Malaysia (UUM), Journal of Holistic Student Development, 2, 1, 35–46.

[8]. Bokhari, N., Razali, A., Yusof, F.M. and Zakaria, N. (2015). Role of uniform bodies in inculcating leadership skills, Procedia-Social and Behavioral Sciences, 204, 343-351.

[9]. Shamsudin, S., Ismail, S. F., Al-Mamun, A. and Nordin, S. K. B. S. (2014). Examining the effect of extracurricular activities on academic achievements among the public university students in Malaysia, Asian social science, 10, 9, 171-177.

[10]. Gupta, A. K. (2008). Quality assurance for Dynamics AX-Based ERP Solutions. Birmingham: Packt Pub. Hellreigel,

[11]. Foreman, E.A. and Retallick, M.S. (2013). Using involvement theory to examine the relationship between undergraduate participation in extracurricular activities and leadership development, Journal of Leadership Education, 12, 2, 56-73.

[12]. Taff, M. A. M., Aziz, A. A. and Zakaria, J. (2011). Kerelevanan Pendidikan luar dalam system Pendidikan tinggi di Malaysia, Asean Journal of Teaching and Learning in Higher Education (AJTLHE), 3, 1, 11-27.

[13]. Ghani, S. A., Awang, M. M., Ajit, G. and Rani, M.A.M. (2020). Participation in Co-Curriculum Activities and Students' Leadership Skills. Journal of Southwest Jiaotong University, 55, 4, 1-13.

[14]. Burt, B. A., et al. (2011). Outcomes of engaging engineering undergraduates in co- curricular experiences. American Society for Engineering Education.

[15]. Mehmood, T., Hussain, T., Khalid, M. and Azam, R. (2012). Impact of co-curricular activities on personality development of secondary school students, International Journal of Humanities and Social Welfare, 2, 18, 139-145.

[16]. Christison, Claudette. (2013). The Benefits of Participating in Extracurricular Activities. BU Journal of Graduate Studies in Education 5, 2, 17-20.

[17]. Massoni, E. (2011). Positive Effects of Extra Curricular Activities on Students. ESSAI, 9, 27, 84-87. Available at: http://dc.cod.edu/essai/vol9/iss1/27

[18]. Tarricone, P. and Luca, J. (2002). Successful teamwork: A case study, Proceedings of the 25th HERDSA Annual Conference, Perth, Western Australia, 7-10 July 2002. 640-646.

[19]. Shcheglova I. A. (2019). Can Student Engagement in Extracurricular Activities Facilitate the Development of Their Soft Skills?, Monitoring of Public Opinion: Economic and Social Changes, 6, 111—121. https://doi.org/10.14515/monitoring.2019.6.07.

[20]. Mustafa, M. Z., et al. (2008). Penguasaan kemahiran berpasukan menerusi penyertaan di dalam kokurikulum: Satu tinjauan di Universiti Tun Hussein Onn Malaysia, Persidangan Pembangunan PelajarPeringkatKebangsaan 2008 UniversitiTeknologi Malaysia, 22-23 Oktober 2008.

[21]. de Prada Creo, E., Mareque, M. and Portela-Pino, I. (2021). The acquisition of teamwork skills in university students through extra-curricular activities, Education + Training, 63, 2, 165-181. https://doi.org/10.1108/ET-07-2020-0185.

[22]. Buhari, A. (2015). Pembangunan kemahiran kerja berpasukan menerusi kokurikulum sukan hoki dalam kalangan pelajar UTHM, Retrieved from https://core.ac.uk/download/pdf/42955413.pdf

[23]. Hamid, R. A. (2012). Pembangunan kemahiran kerja bepasukan menerusi kokurikulum sukan bola speak dalam kalangan pelajar UTHM, Retrieved from https://core.ac.uk/download/pdf/42953985.pdf

[24]. Abdullah, H. and Ainon, M. (2002). Kemahiran Interpersonal untuk Guru. PTS Publication & Distributor Sdn. Bhd.

[25]. Adu-Oppong, A. A., and Agyin-Birikorang, E. (2014). Communication in the workplace: Guidelines for improving effectiveness. Global journal of commerce & management perspective, 3(5), 208-213.

[26]. Carter, D. F., Ro, H. K., Alcott, B. and Lattuca, L. R. (2016). Co-curricular connections: The role of undergraduate research experiences in promoting engineering students' communication, teamwork, and leadership skills, Research in Higher Education, 57, 3, 363-393.

[27]. Mangkau, I. D. (2012). Penguasaan kemahiran komunikasi dalam kalangan pelajar Universiti Tun Hussein Onn Malaysia (UTHM), In Prosiding Seminar Pendidikan Pasca Ijazah dalam PTV Kali Ke-2, Johor Bahru, 40-59.

[28]. Masduki, M. and Zakaria, N. (2020). Fulfilling the Demand for Workplace Communication Skills in the Civil Engineering Industry, Pertanika J. Soc. Sci. & Hum, 28, 4, 3069-3087.

[29]. Lenard, D. B. and Pintarić, L. (2018). Comparison of Employers' and Students' Perceptions Regarding Communication Skills, Journal of Teaching English for Specific and Academic Purposes, 6, 1, 63-82.

[30]. Alnaeem, L. (2021). Involvement in Extracurricular Activities and Overcoming High Levels of Communication Apprehension among Saudi EFL Majors. Arab World English Journal, 12, 2, 185-208. DOI: https://dx.doi.org/10.24093/awej/vol12no2.13

[31]. Fadzil, N. S. and Ahmad, J. (2010). Kepentingan Kokurikulum dalam Pendidikan di Sekolah Menengah, In Proceedings of the 4th International Conference on Teacher Education; Join Conference UPI & UPSI, Bandung, Indonesia, 8-10 November 2010, 59-69.

[32]. Adnan, W. N. and Warman, S. (2017). Extra-curricular Activities Affect Students to Develop Social Skills, Elixir Leadership Mgmt, 105, 46034-46036.

[33]. Esa, A., Yunus, J. M. and Kaprawi, N. (2005). Persepsi Pensyarah Terhadap Penerapan Kemahiran Komunikasi Menerusi Kokurikulum di Politektnik, Jurnal Penyelidikan Pendidikan Malaysia, 7, (1), 3-13.

[34]. Romeli, N. (2012). Tahap kemahiran berfikir kreatif dan kritis dalam kalangan pelajar Diploma Pendidikan Lepasan Ijazah Universiti Tun Hussein Onn Malaysia, Retrieved from https://core.ac.uk/download/pdf/42953985.pdf

[35]. Lai, E. R. (2011). Critical thinking: A literature review, Research Reports, Pearson.

[36]. Ennis, R. H. (1989). Critical thinking and subject specificity: Clarification and needed research, Educational Researcher, 18, 3, 4-10.

[37].Gellin, A. (2003). The effect of undergraduate student involvement on critical thinking: A meta-analysis of the literature 1991–2000, State University of New York at Buffalo. ProQuest Dissertations Publishing.

[38]. Sternberg, R. J. (1986). Critical thinking: Its nature, measurement, and improvement National Institute of Education, Washington, Retrieved from http://eric.ed.gov/PDFS/ED272882.pdf.

[39].Astleitner, H. (2007). Teaching Critical Thinking Online, Journal of Instructional Psychology, 29, 2, 53-77.

[40]. Leach, B. T. (2011). Critical thinking skills as related to university students' gender and academic discipline (Doctoral dissertation, East Tennessee State University).

[41]. Snyder, L. G. and Snyder, M. J. (2008). Teaching critical thinking and problem-solving skills, Delta Pi Epsilon Journal, 50, 2, 90–99.

[42]. Kuan, G., et al. (2019). Co-curricular activities and motives for participating in physical activity among health sciences students at Universiti Sains Malaysia, Malaysia, The Malaysian Journal of Medical Sciences, 26, 1, 138-146. DOI: https://doi.org/10.21315/mjms2019.26.1.13

[43]. Ahyad, N. A. A. et al. "Discovering Students' Preference on College's Activity: Kolej Tuanku Canselor Case Study." International Conference on Student and Disable Student Development 2019 (ICoSD 2019). Atlantis Press, 2020.

[44]. Zare, P. and Othman, M. (2015). Students' perceptions toward using classroom debate to develop critical thinking and oral communication ability, Asian Social Science, 11, 9, 158-170.

[45]. Garrett, M., Schoener, L. and Hood, L. (1996). Debate: A teaching strategy to improve verbal communication and critical-thinking skills, Nurse Educator, 21, 4, 37-40.

ESTABLISHING EFFECTIVE ADVISING PRACTICES AMONG UTM FOUNDATION LECTURERS

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ABSTRACT - Academic advising is one of the most important levels to pull within the university to positively impact student success. It provides perhaps the only opportunity for all students to develop a personal, consistent relationship with someone in the institution who cares about them. This paper aims to establish effective advising practices among UTM foundation lecturers. A structured questionnaire consisting of twenty-seven items was designed and distributed to the foundation lecturers. These twenty-seven items are characteristics/responsibilities that are most often cited in the literature as critical for ensuring effective academic advisory. The study found that 44.4% of the lecturers answered that they have conducted a mass meeting 1 - 2 times in a single semester and another 44.4% have conducted a mass meeting with their advisees 3 - 4 times in a semester. Students also reported to discuss on their drop in CGPA with their academic advisors on a regular basis. Almost half of the lecturers were 'neutral' on the effectiveness of online and face-to-face academic advising. Majority agreed that they addressed students' personal problems; self-esteem / interpersonal skills / study skills; student values, beliefs, and attitudes during the academic advising sessions.

Keywords: effectiveness of academic advising; lecturers; foundation students

1. INTRODUCTION

Providing excellent student performance advice to foundation students has always been an important but challenging task. Students need strong support systems in place to help them transit from one education level to the next. Generally, students begin their tertiary education with limited knowledge about career prospects related to the courses they are enrolled in. Students who are undecided about their major can be vulnerable to outside influences that could either help or hinder their decision with regard to selecting the right academic course. An academic advisor

can help keeping students focused on important goals. It is vital as it is related to the student's performance, success, satisfaction, and retention.

Based on the previous research [1], another factor that is related to the student's success is education. The mission of academic advising is to assist students in their growth and development in academic or non -academic matters by constructing meaningful educational plans compatible with their life goals. This is a continuous and consistent process built on frequent and accumulated personal relationships between an advisor and advisee. Advice from educators through informal and formal advising sessions gives positive impacts on students' academic performance, career goals, intellectual curiosity, and development of educational and interpersonal skills [2].

The faculty or department of a university also plays an important role in helping students to adjust and integrate into university life [3]. The mission of academic advising and counselling unit is to support students in recognizing and achieving their educational and career goals which facilitate their learning experience and student success [4]. The publication of Academic Advising Handbook is a proactive step in ensuring that students' academic achievement, character development, and positive characteristics are always monitored from the first semester to the last semester. Continuous monitoring and guidance is the responsibility of all academic advisors in helping to produce successful graduates and fulfil the aspects of soft skills and noble values [5].

Academic advising is one of the most important levels to pull within the university to positively impact student success. It provides perhaps the only opportunity for all students to develop a personal, consistent relationship with someone in the institution who cares about them. Therefore, this paper aims to establish effective advising practices among UTM foundation lecturers.

Some of the researchers defined academic advisor as the institutional staff or faculty member that takes the duty of providing assistance, guidance, and communication with students in term of many aspects especially in life planning, career goals and navigation of how those goals intersect with institutional course and programme offerings [6]. Academic advising is the second most important function in the college [7]. Academic advising applies knowledge of the field to empower students, campus and community members to successfully navigate academic interactions related to higher education [8].

Academic advising is an important aspect of higher education and student academic performance. [9] pointed out that academic development, personal development and career development are the first, second, and third themes most stated by the academic advisors when asked regarding their perceptions towards academic advising.

Research finding also showed that the relationship built between the students and their assigned academic advisors was reported to increase satisfaction as a part of their college experience, positively develop the students, [10], and give impact on self-efficacy in the practical applications of study skills [11]. The advising strategies in assisting students are used to develop rapport with them, evaluate student motivation, and explain university rules, policies, regulations, and procedures that affect academic programmes and activities [12]. Furthermore, academic advisor's personality and behaviour are also crucial in ensuring its effectiveness which could be seen by providing references to other university resources when necessary, helping the students to assess their college major choice realistically, assisting the students to attain their immediate educational goals, providing information regarding courses, requirements, tests, registration, course changes, and helping students to evaluate and understand their educational goals, and providing ample opportunities for students to ask questions [13].

There are few ways to improve the quality of academic advising as determined by previous researchers. [14] identified a dozen targeted areas of improvement where any potentially effective attempt to improve academic advisement must be guided by a clear vision of what "good quality" or "poor quality" advising actually is. [15] found that professional values, professional skills and behaviour, plus training and continuing professional education/development are the aspects and skills in ensuring the effectiveness and success of Academic Advising and Personal Tutoring.

Furthermore, while academic advising meetings are necessary for developing rapport with students, there are no fixed frequencies for mass meetings and no one-size-fits-all approach to conduct an academic advising meeting (depends on the reason for the meeting). It is important for advisors to manage an advising file for each advisee with proper documentation from the meeting [16]. Many types of meeting contacts are available such as in person contact, telephone contact, email contact and online meeting. Any involved information during in person contact that will assist current or future advisors and academic support staff in guiding the students to the successful completion of degree needs to be documented and

summarized, while all telephone contacts should be documented electronically [17].

The literature review proves that effective academic advising provides many benefits and impacts on student's achievements; hence, this study focuses on establishing effective advising practices among UTM foundation lecturers.

2. MATERIALS AND METHODS

2.1. Research design

The researcher endeavoured to investigate the feedback from foundation lecturers regarding the aspects needed in academic advising and their satisfaction towards the implementation of the current academic advising approach in UTM foundation programme. The study incorporated quantitative research design in order to achieve the objective of the study.

2.2. Participants

A total of nine respondents from UTMSPACE foundation programme lecturers who were assigned as academic advisors had participated in this study. The number of samples was obtained purposively as the nine lecturers participated in the study are qualified and has the characteristic of sample required. They were the assigned academic advisors who had specifically catered to the foundation students who are the main focus of the study. [18] also emphasises that the samples for sampling that "can provide useful information for answering questions and hypotheses" are sufficient.

2.3. Instrumentation

A structured questionnaire consisting of twenty- seven items was designed and distributed to the lecturers who were assigned as the academic advisors to foundation students. These twenty-seven items consist of characteristics/responsibilities that are most often cited in the literature as critical for ensuring effective academic advising. The lecturers were asked to provide some aspects of academic advising background, share their past experiences in handling the students under their supervision and rate the aspects and factors that

can contribute to effective academic advising on each item on a 5-point Likert scale namely; strongly agree, agree, neutral, disagree, and strongly disagree.

3. RESULTS AND DISCUSSION

3.1. Respondent background

Among the 9 respondents, 22.2% of them have had experience as the academic advisors for 2 batches of UTM foundation students, while the remaining 77.8% have only recently been appointed as the academic advisors for UTM foundation students for the first time.

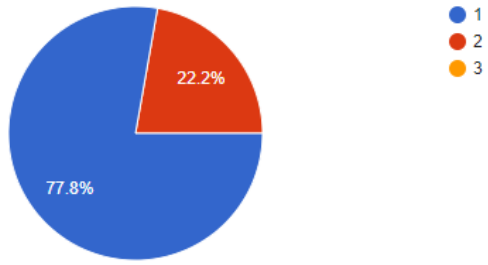

Fig. 1: Number of batches under 1 advisor

Even though each academic advisor has more than 40 students under him/her, different views on the appropriate number of advisees can be seen in the chart below. 44.4% advisors agreed that only 1-10 students should be put under the supervision of one academic advisor, while 33.3% of the respondents agreed that 11-20 students in a single academic advising group is sufficient. On the other hand, only 1 respondent agreed that 21-30 students and more than 40 students is appropriate to be supervised by one academic advisor.

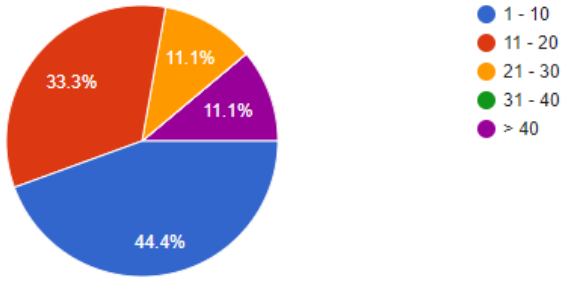

Fig. 2: Number of Students Suggested Under One Academic Advisor

The frequency of conducting a mass meeting with the academic advisees in one semester are is as illustrated in Figure 3 as follows.

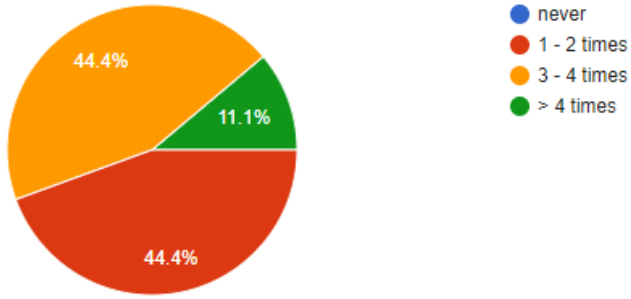

Fig. 3: Frequency of Conducting a Mass Meeting with Academic Advisees

The chart above shows the result on the frequency of mass meeting being conducted with the academic advisees in one semester (4 months) where four advisors answered that they have conducted at least 1 - 2 times and the other four of them have conducted it for 3 - 4 times in a semester. Surprisingly, it can also be seen that one advisor managed to meet his / her advisees more than 4 times during the mass meeting throughout one semester.

Based on Figure 4 below, the frequency of the academic advisors to personally contact their academic advisees who achieved lower than 3.0 CGPA are as follows.

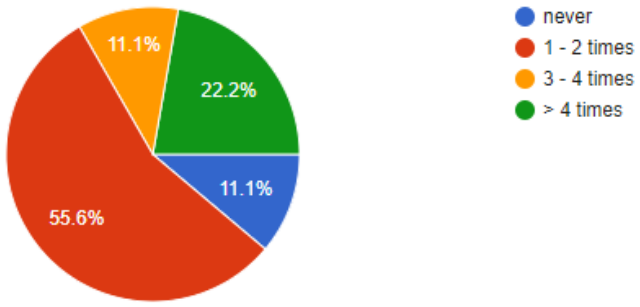

Fig 4: Frequency of the academic advisors personally contacted the academic advisees

The result shows that majority of the lecturers who were appointed as academic advisors have personally contacted their academic advisees who achieved a CGPA of 2.9 and below around 1 - 2 times in one semester. Only two of them have contacted the advisees for more than four times which could be considered a sign of commitment and accountability, while one respondent contacted his / her advisees 3 - 4 times per semester and one advisor who has never contacted his/her advisees who obtained lower than 3.0 CGPA.

3.2 Common Topics Discussed during Academic Advising Session

The common topics discussed during academic advising session with advisees are as depicted in Table 1 as follows.

Table 1: Common Topics Discussed during Academic Advising Session with Advisees

Common topics discussed during academic advising session	Percentage
Drop in CGPA	55.6%
Career aspirations	22.2%
Personal problems	22.2%
Health issues	0%

Under the aspect of common topics being discussed during the meeting with academic advisees, 55.6% of the academic advisors have responded that students commonly discussed related to their drop in CGPA, while 22.2% of them agreed that advisees would discuss on their career aspiration issues in setting up a goal to

be reached as they progress in their studies. In addition, 22.2% of the academic advisors reported that personal problems were among the common topics being discussed during the sessions. This provides a platform for the advisees to discover effective solutions on their own.

3.3 The effectiveness of academic advising practice among foundation lecturers

The survey was conducted to identify the effectiveness of academic advising practices among UTM foundation lecturers and finding the best way to improve the quality of advising practices. Based on the results below, it was found that majority of the lecturers with 87.5%, agreed to have one specific guideline for academic advising. The guidelines are intended to provide a standardized procedures or approaches in academic advising and to enhance the appropriateness of practice while improving the quality of academic advising.

Table 2. Lecturers' Perspectives on Academic Advising Matters

Lecturers' perspective	Agree	Neutral	Disagree
A necessity to have specific guidelines for academic advising.	87.5%	12.5%	0%
Online academic advising can be conducted as effective as face-to-face academic advising.	33.3%	44.4%	22.3%
Conversation on non-academic topics, including students' personal problems; self-esteem / interpersonal skills / study skills; student values, beliefs, and attitudes and the conflicts between them have been discussed during academic advising session.	88.8%	0	11.2%

As for some of the academic advisors, it was their first time being appointed as an academic advisor, 87.5% of them agreed to have one specific guidelines on academic advising, while 12.5% were just neutral on that matter. It is believed that if academic advisors are equipped with adequate training and guidance, the advisees would receive the best advice or service possible as mentioned by [15], professional values, professional skills and behaviour, plus training and continuing professional education/development are the aspects and skills in ensuring the effectiveness and success of Academic Advising and Personal Tutoring.

Being an academic advisor during this pandemic period has led to the emergence of comparison between online and face-to-face academic advising. As stated in the table above, 44.4% respondents were 'neutral' when being asked on the effectiveness of online and face-to-face academic advising. Most probably, many of them have chosen 'neutral' because they have not been given the chance to be an academic advisor before the pandemic, so they would not be able to compare on the effectiveness. However, 33.3% of them agreed that they could make the online academic advising as effective as the face-to-face. Nevertheless, 22.3% respondents found it hard to fulfil the responsibilities of an academic advisor when they could not communicate face-to-face with the students. This was supported by [12] that the advising strategies or method in assisting students is one of the contributing factors in ensuring the effectiveness of academic programmes and activities.

Other than discussing on the academic matters, 88.8% respondents agreed that they addressed students' personal problems; self-esteem / interpersonal skills / study skills; student values, beliefs, and attitudes during the academic advising sessions. This is to show that addressing only academic matters is insufficient. However, 11.2% respondent did not include all the above mentioned issues during those sessions. This can be further supported by [9] who pointed out that academic development, personal development and career development are the first, second, and third themes most stated by the academic advisors when asked regarding their perceptions towards academic advising.

4. CONCLUSION

To summarize, an academic advisor serves a variety of functions in providing the guidance needed by students throughout their journey in the tertiary level institution. Apart from providing advice related to academics, an advisor is also the "parent" who monitors the student's growth and development. Therefore, the way the advisor portrays him/herself in front of his/her students, as well the advice given to them will have an impact on the decisions made by these students during their studies. Some aspects of academic advising had been included in the study as well as discussed with the academic advisors of UTM Foundation Programme in order to determine their practices with their foundation students. Being quite new to the programme, most respondents did not have the experience of being an advisor to more than one batch. Therefore, these guidelines will certainly help to improve the lecturers' advising skills from one batch to another. Furthermore,

most academic advisors believed that by monitoring no more than 20 students every batch will likely increase the quality of their service as an advisor when compared to monitoring up to 40 or more students per batch. Apart from that, regular meetings with students are quite low, with advisors holding up to 2 meetings only per semester. Overall, this study was a success for the researchers in identifying UTM Foundation academic advisors' practices with foundation students, allowing them to provide additional suggestions or room for improvement in their advising skills which would likely affect their students.

ACKNOWLEDGEMENT

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REFERENCES

[1]. Albalooshi, F., and Shatnawi, S. (2010). HE-Advisor: A Multidisciplinary Web-Based Higher Education Advisory System. Global Journal of Computer Science and Technology, 10(7), 37–49.

[2]. Dem, A., & Ok, A. (2001). Improving Academic Advising: A Case Study. Program, 20, 57–64.

[3]. Away, E. A. H., and Kelloway, K. R. (1987). First Year at University : Perceptions and Experiences of Students. The Canadian Journal of Higher Education, XVII (1), 47–63.

[4]. University, I. A. bin F. (n.d.). Academic Advising and Teachable Moments.

[5]. Universiti Teknikal Malaysia Melaka (UTEM). (2014). Buku Panduan Penasihat Akademik (Staf Akademik) (p. 44).

[6]. Dickson, T., &Avants, L. (2014). A Case Study on the Processes of Academic Advising in a School-Centric Environment (Issue May).

[7]. Fricker, T. (2006). The Relationship between Academic Advising and Student Success in Canadian Colleges: A Review of the Literature. Writing, 9(4), 1–18.

[8]. Larson, J., Johnson, A., Aiken-Wisniewski, S. A., and Barkemeyer, J. (2018). What is Academic Advising? An Application of Analytic Induction. NACADA Journal, 38(2), 81–93.

[9]. Van, N. T., & Said, H. (2018), Academic advisors perceptions of academic advising in public universities of Malaysia. International Journal of Educational Best Practices (IJEBP), 2 (2). pp. 34-48. ISSN 2581-0847.

[10]. Pargett, Kelly. 2011. The Effect of Academic Advising on College Student Development in Higher Education. Educational Administration: Theses, Dissertations and Student's Research; Lincoln: University of Nebraska-Lincoln.

[11]. Saba'Ayon, N. (2015). Academic advising: Perceptions of students in a Lebanese University. IJAEDU-International E-Journal of Advances in Education, 1(2), 118-126.

[12]. Ford, J. (2001). Example University: Academic Advising Handbook.

[13]. Barr, J., & Lopez, M. (1976). Orientation Advisor Effectiveness: A Continuing Search. Journal of Collage Student Personnel, 17(1), 16–21.

[14]. Cuseo, Joe. (2015). Effective Delivery of Academic Advising Programs. 10.13140/RG.2.1.1395.9848.

[15]. McGill, C. M., Ali, M., & Barton, D. (2020), Skills and Competencies for Effective Academic Advising and Personal Tutoring, Frontiers in Education,5, pp 135. ISSN 2504-284X.

[16]. Niu, University, N. I. (2018). Guidelines for Academic Advising. Creswell, J. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th ed.). Boston, MA: Pearson.

APPENDIX

Questionnaire

Dear academic advisors,
We would like to invite you to participate in this research survey on 'The Effectiveness of Academic Advising on Students' Performance' in our institution. Thank you for your willingness to spare your time in answering this questionnaire. The purpose of this research is to examine the effectiveness of academic advising on students' performance. We would like to humbly request you to read the questions provided carefully and to respond as accurately as possible. All information provided in this survey will in no means reflect the identity of the participants. It will be kept strictly confidential and will be used only for the purpose of the research. Your kind cooperation in this study is highly appreciated. Thank you.

1. Number of batches (UTM foundation students) that have been under my academic advising including the current one

    - 1
    - 2
    - 3

2. Number of students that would be suitable to be placed under a single academic advisor

    - 1 – 10
    - 11 – 20
    - 21 – 30
    - 31 – 40
    - > 40

3. Frequency of conducting a mass meeting to see the academic advisees in 1 semester (4 months)

    - Never
    - 1 – 2 times

- 3 – 4 times
- > 4 times

4. Common topic being discussed during the meeting

   - career aspirations
   - Drop in CGPA
   - Personal problems
   - Health issues

5. Frequency of personally contacting my academic advisees who get lower than 3.0 (CGPA) in 1 sem

   - Never
   - 1 – 2 times
   - 3 – 4 times
   - > 4 times

6 - 21. Instruction: Please (√) to indicate your answer based on the scale of: Strongly Disagree (1), Disagree (2), Neutral (3), agree (4), Strongly agree (5)

No.	Questions	1	2	3	4	5
6.	It is necessary to have specific guidelines of academic advising that will provide necessary information, procedures and resources in handling students.					
7.	Academic advising is a fun task to be done as an academician.					
8.	Being an academic advisor would be tough for me.					
9.	With online academic advising, I would be able to recognise and remember every single one of my academic advisee.					

10	I would be able to make online academic advising as effective as face-to-face academic advising.					
11	I have personally asked my academic advisees (CGPA : <3.0) to send their aim for the upcoming semester in order to monitor their CGPA.					
12	I have taught my academic advisees on how to calculate their CGPA.					
13	I do not mind if my academic advisees choose to seek for advice from other academic advisors / lecturers instead of me.					
14	If my academic advisee decides to change to another section, I think that he / she should still be under my supervision.					
15	Searching for financial assistance (scholarship, zakat, bursary etc) is a part of my responsibilities.					
16	I have included conversations on topics other than academics, including students' personal problems; self-esteem / interpersonal skills / study skills; student values, beliefs, and attitudes and the conflicts between them when I conducted my academic advising.					
17	Giving advice which focuses on student's values and attitudes would be as significant as giving advice on student's academic performance.					
18	I have a balance in enhancing both student's values & attitudes and student's academic performance.					
19	I have experienced a difficult situation / problem due to my negligence in my academic advising process.					
20	I have learnt and discovered a better solution after facing that problem.					
21	I would restructure my strategies in academic advising if I am given another batch under my supervision.					

22. In what aspect that SPACE can help you in enhancing your academic advising skills?

_____
_____
_____
_____
_____

SYNCHRONOUS AND ASYNCHRONOUS ONLINE DISTANCE LEARNING: PART TIME DIPLOMA IN ENGINEERING STUDENTS LEARNING PREFERENCES

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ABSTRACT - Over the years, UTMSPACE has been established for various forms of distance learning programmes that have helped realise the educational aspirations of students who could not attend the full-time mode of study. Distance learning refers to courses that are studied without the need to be physically present at the campus. Synchronous and asynchronous are two main types of distance learning. This paper highlights part-time engineering students' preferences in online distance learning and evaluates those impacts in their virtual mode of classes. The synergy between quantitative and qualitative methods is applied in this research. To understand student opinions of synchronous and asynchronous online learning, questionnaires had been distributed. To support the survey data, the interview was conducted for three engineering courses by individual and focus groups. From the analysis, four factors emerged as contributing to part-time engineering students' preferences regarding online distance learning: students' access system to learning materials, strength and weakness aspects of online learning interaction, the nature of subjects, and students' time management. The most crucial result of this study is that the participants seemed to be preferring a combination of synchronous and asynchronous learning methods, which is suitable for their positions as full-time employees.

Keywords: Online Distance Learning, Part Time Engineering Students, Synchronous and Asynchronous Learning

1. INTRODUCTION

As Malaysia is rapidly transforming into a knowledge-based nation, the development of continuing education is needed to accommodate its increasing demand for skilled personnel in the construction and manufacturing industry. Many full-time workers take distance courses due to work and social schedules; they prefer the flexibility of engaging in their educational experiences in settings of their preference to complete their engineering studies. UTMSPACE, as the subsidiary company under Universiti Teknologi Malaysia (UTM), premier

university in engineering and technology in Malaysia, offers part-time mode of studies for such individuals. According to Madden and Jones (2017), distance learning refers to courses that are studied without the need to be physically present at the campus [1]. Since 2017, UTMSPACE has been practising a blended learning, the combination both online and face to face learning experience. Due to the COVID-19 pandemic, UTMSPACE has transformed the traditional method of study from face-to-face weekend classes to more flexible online learning [2].

Universities and colleges are increasingly embracing new technologies and leveraging them, not only to enhance their traditional curriculums but also to extend course offerings beyond the college campus. Conventional face-to-face learning, which had been practiced at UTMSPACE for part-time students, has been transformed into online learning via synchronous and asynchronous methods. The opportunities to increase interaction between part-time students and UTMSPACE will be created based on the previous research, which has shown the positive benefits of informal student–faculty interaction outside the classroom, including higher levels of student satisfaction, retention and academic performance [3][4]. Students who have positive experiences are more likely to re-enrol in online courses in the future, so an institution that seeks to increase online enrolment would benefit from such information. Data on part-time engineering student experiences can also provide information to help institutions and faculty to design and deliver better online engineering courses, which could help improve engineering students' learning in these courses. Such data could also help determine what challenges students face in the online mode of learning, which could in turn improve persistence and retention in online courses.

The aims of this study were to determine students' preferences on two forms of learning interaction (synchronous web-conferencing and asynchronous) while keeping learning strategies consistent across each method. This was to find out how these strategies influence learner motivation and self-regulation, social presence, satisfaction and learning process and outcomes in small, interactive and collaborative online courses. Some questions on this study seeks to address are as follows: What is the impact of different communication methods on student and lecturer's online interaction? Does this vary depending on internet speed and coverage or any other specific function? These questions go beyond the mere forms of identity presentation on Blackboard and aim to measure the effectiveness of teaching and learning by synchronous and asynchronous methods.

2. MATERIALS AND METHODS

The participants of this study consisted of 77 students. They were enrolled in three main engineering courses in the diploma level at UTMSPACE, Kuala Lumpur, on the part-time basis. Students were varied in terms of their age, socioeconomic status and work experiences in the public and private sector. More than 80% of them were male students. Data on current active students were obtained from the Centre of Part-Time Studies, UTMSPACE, Kuala Lumpur.

2.1. Communication to Facilitate Student–Faculty Interaction – Synchronous or Asynchronous

The most common forms of communication used by faculty to facilitate interaction with students include the use of asynchronous (e.g. email and online discussion boards) and synchronous communication (e.g. chat or instant messaging). Most of the research related to the use of asynchronous communication in higher education has focused on distance learning courses that utilise web-based communication technologies to deliver course content virtually, thus involving extensive student–instructor communications [5]. Synchronous online communications have been used with success in several studies of distance learning environments [6]. The most common forms of such communication are "chat" or instant messaging. In a comparative study of synchronous and asynchronous learning technologies, found that synchronous chat created a feeling of community among students enrolled in a graduate course [7]. Previous study conducted a field study of synchronous chat in an online course and found the student satisfaction to be highest in courses where synchronous chat sessions were offered in addition to face-to-face methods. This finding was consistent with study, which also found the "chat" function of commercial course management systems less effective for more in-depth topics [8].

2.2. Research Design

The mixed methodology, involving quantitative as well as qualitative research, has been applied in this research, as it is believed that both are important in understanding students' satisfactions. In this study, the literature review covered the synchronous and asynchronous implementation on distance learning according to three settings on the academics assist. The two-stage sequential mixed-methods study aimed at obtaining qualitative results from focus group discussions and in-depth interviews with participants in a targeted group, which was followed by the statistical quantitative results [9].

3. RESULTS AND DISCUSSION

3.1. Online Learning Information

This study classifies into three (3) categories; Synchronous learning method limited to web conferencing by using Blackboard Collaboration, Webex and Google Meet. Asynchronous method; pre-recorded video, Whatsapp and email; Combination of synchronous and asynchronous learning method. The findings demonstrate that 2 (2.6%), 17 (22.1%), 49 (63.6%), 3 (3.9%), 4 (4.2%) and 1 (1.3%) participants used desktop, laptop/notebook; laptop/notebook, smartphone; laptop/notebook, tablet, smartphone; PC desktop; smartphone and tablet; and smartphone, respectively. Only 1 out of 77 respondents using the combination of tablet and smartphone in the virtual learning. With respect to the type of internet access, 29 (37.7%) used cellular phone/mobile data, 16 (20.8%) used Fiber to home, 2 (2.6%) used Wi-Fi, broadband, cellular phone/mobile data, 3 (3.9%) used Wi-Fi, cable modem, cellular phone/mobile data, 2 (2.6%) used Wi-Fi, cable modem, Fiber to home, cellular phone/mobile data and 25 (32.5%) used Wi-Fi, cellular phone/mobile data to access internet. Essentially, 44 (57.1%), 13 (16.9%) and 20 (26%) of the participants answered ‘yes’, ‘no’ and ‘not sure’ to whether online learning can give a positive learning experience.

The results of the analysis indicate that 10 (13%) and 41 (53.2%) of the participants perceived good content delivery using online learning method and instructor as the approach that can increase positive vibes during online learning. Furthermore, 8 (10.4) and 18 (23.4%) of the participants indicated learning activities and others as the method that can increase positive vibes during online learning. Table 1 illustrate in details of the respondent’s information in using the typical digital device. Figure 1 shows the frequent type of internet access used by the participants when reaching out the online learning.

Table 1. Online Distance Learning Information

Internet	n	%
Type of digital device		
Desktop	2	2.6
Laptop/Notebook	17	22.1
Laptop/Notebook, Smartphone	49	63.6
Laptop /Notebook, Tablet, Smartphone	3	3.9
PC Desktop	1	1.3
Smartphone	4	5.2
Tablet, Smartphone	1	1.3

Types of internet access		
Cellular Phone/Mobile Data	29	37.7
Fiber to Home	16	20.8
Wi-Fi, Broadband, Cellular Phone/Mobile Data	2	2.6
Wi-Fi, Cable Modem, Cellular Phone	3	3.9
Wi-Fi, Cable Modem, Fiber to Home, Cellular Phone/Mobile Data	2	2.6
Wi-Fi, Cellular Phone/Mobile Data	25	32.5
Do you think that online learning can give a positive learning experience?		
Yes	44	57.1
No	13	16.9
Not Sure	20	26.0
What do you think can increase positive vibes during online learning?		
Content delivery using media	10	13.0
Instructor	41	53.2
Learning activities	8	10.4
Others	18	23.4

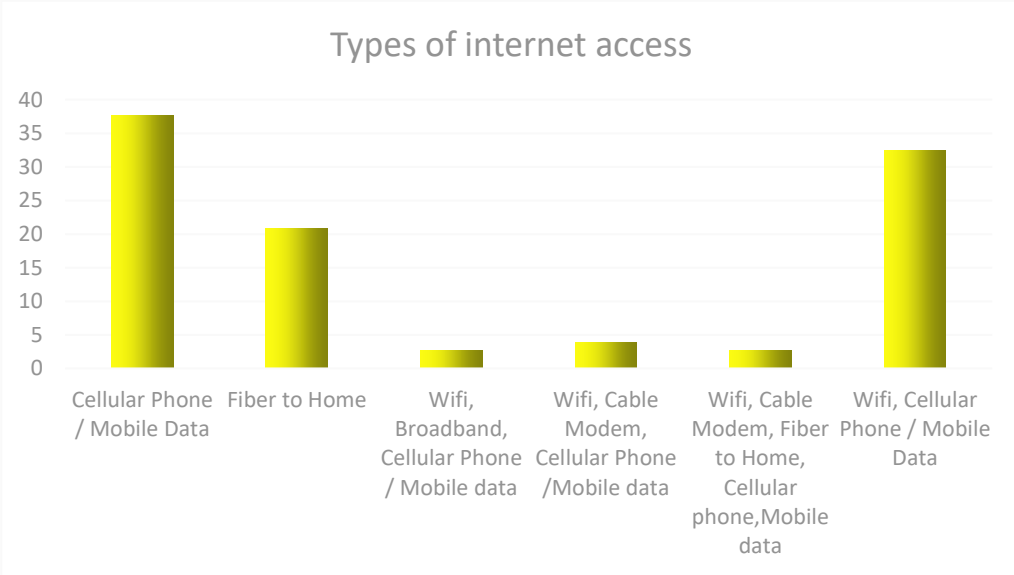

Figure 1. Type of Internets Access

3.2. Research Question 1: How do working day and income impact their online learning as part-time students?

A better understanding for part-time students to feel connected to UTMSPACE and what their online learning expectations are to remain at their learning institution will influence their success and decisions. The demographic data, as shown in the Table 2, were obtained from questionnaires to enhance the interpretation of the results. About 18 participants (23.4%) had shift rotation working day, and 16 students (20.8%) had to commit for the job six days per weekend, whereby the time does not tally with classes on weekend schedules, causing the students to be underprepared.

For distance learning students, online courses offer them an opportunity to access the course without boundaries. Majority of part-time learners' ages range between 30 and 39 years, and they are in the peak of their professional careers. They have limited time to focus on weekend classes through semesters. Moreover, with less credit taken compared to full-time students, the duration of completing the course is often much longer. However, students cite flexibility and convenience as primary advantages of online learning. These features make online courses particularly valuable to adults with multiple responsibilities and highly scheduled lives. Thus, online learning can be a boon to workforce development, helping people who have to cope with adult responsibilities to return to higher institution and complete additional education that otherwise could not fit into their daily routines. The flexibility of online learning would be a strategy that is thought to contribute to the relatively high graduation rate for part-time students.

Table 2. Student demographic profile

Demographic Profile	**n**	**%**
Gender		
Male	66	85.7
Female	11	14.3
Age (years)		
20 to 29	29	37.7
30 to 39	36	46.8
40 to 49	10	13.0
50 above	2	2.5
Programme		
Diploma in Civil Engineering	32	41.6
Diploma in Mechanical Engineering	13	16.9

Diploma in Electrical Engineering	32	41.6
Normal working day		
Mon to Fri	43	55.8
Mon to Sat	16	20.8
Shift Rotation	18	23.4
Income		
B40 (Less than RM 4849)	34	44.2
M40 (RM 4850–RM 10959)	33	42.9
T20 (> RM 10959)	10	13.0

3.3. Research Question 2: What made their experience with the online communication method (synchronous and asynchronous) satisfactory or unsatisfactory?

3.3.1 Descriptive Analysis

Beginning with the quantitative approach, the responses of the participants indicate that a large percentage of them agree that they enjoy learning from synchronous lectures, as indicated by the mean of 4.23 ± 0.93. However, as Table 3 shows, the participants gave a neutral response with respect to statements B10, B11, B12 and B13, as evident by the neutral mean of 3.90 ± 0.88, 3.61 ± 1.08, 3.88 ± 0.86 and 3.48 ± 0.88, respectively. Moreover, a large section of the participants agree that they are satisfied with the online assessments that students need to undertake in real time, such as quizzes, tests and exams, as indicated by the above-average mean of 4.00 ± 0.84. Conversely, the participants gave a neutral response with respect to statements B15, B16, B17, B18 and B19, as illustrated by the neural standard deviation and mean of 3.48 ± 0.91, 3.44 ± 0.68, 3.48 ± 0.93, 3.30 ± 0.78 and 3.48 ± 0.98, respectively.

Table 3. Synchronous vs Asynchronous Online Learning Experience

No	Statement	SD		D		N		A		SA		Mean	SD
		n	%	n	%	n	%	n	%	n	%		
B9	I enjoyed learning from synchronous lectures			4	5.2	14	18.2	19	24.7	40	51.9	4.23	0.93
B10	The amount of interaction SYNCHRONOUSLY with instructor/lecturer is adequate			7	9.1	13	16.9			19	24.7	3.90	0.88
B11	The amount of interaction with classmates is adequate (SYNCHRONOUS)	5	6.5	5	6.5	20	26.0	32	41.6	15	19.5	3.61	1.08
B12	I do understand learning by SYNCHRONOUS method			6	7.8	15	19.5	38	49.4	18	23.4	3.88	0.86
B13	I believe that learning SYNCHRONOUSLY using the internet is easier	1	1.3	12	15.6	18	23.4	41	53.2	5	6.5	3.48	0.88
B14	I am satisfied with the online assessments that students need to do in real time, such quizzes, tests and exams (SYNCHRONOUS)			3	3.9	18	23.4	32	41.6	24	31.2	4.00	0.84

B15	I enjoyed learning from asynchronous lectures	1	1.3	8	10.4	32	41.6	25	32.5	11	14.3	3.48	0.91
B16	The amount of interaction with instructor/lecturer is adequate	1	1.3	4	5.2	33	42.9	38	49.4	1	1.3	3.44	0.68
B17	I do understand learning by ASYNCHRONOUS method	1	1.3	6	7.8	39	50.6	17	22.1	14	18.2	3.48	0.93
B18	The amount of interaction with classmates was adequate (ASYNCHRONOUS)	2	2.6	8	10.4	33	42.9	33	42.9	1	1.3	3.30	0.78
B19	I am satisfied with the online assessment that students need to do in real time such quizzes, tests and exams (ASYNCHRONOUS)	4	5.2	2	2.6	33	42.9	29	37.7	9	11.7	3.48	0.93

**SD – Strongly Disagree*
D – Disagree
N – Neutral
A – Strongly Disagree
SA – Strongly Agree

The integration of quantitative and qualitative data collection and analysis in this study effectively facilitates a triangulation to fulfil the objectives with saturated and rigid feedback from respondents, thus reinforcing the conclusions. To support the survey data findings, the interview was conducted for a focus group from three engineering courses; it is a guided discussion that systematically investigates what a diverse group of people think of a set of research questions. The interview transcriptions were made by interpretation of themes and categories as shown in Table 4.

Table 4. Code/category triangulation schedule between study participants

No.	Theme/Category/ Sub category	ES 1	ES 2	ES 3	ES 4	ES 5	ES 6
1	Satisfied						
1.1	Synchronous						
1.1.1	Classroom engagement	√	√	√			
1.1.2	Deep interaction	√	√		√	√	√
1.2	Asynchronous						
1.2.1	Flexibility	√	√	√	√	√	√
1.2.2	Convenient for groupwork	√	√				
1.2.3	Level of understanding	√	√				√
2	Not satisfied						
2.1	Synchronous						
2.1.1	Fixed time	√	√	√			
2.1.2	Internet coverage	√	√				
2.2	Asynchronous						
2.3.1	Learning independently		√		√	√	√
2.3.2	Lack of communication		√				

**ES – Engineering student*

3.4. Research Question 3: To what extent is the asynchronous learning method (pre-recorded lectures, WhatsApp and email) effective compared with the synchronous learning method (Blackboard Collaborate, Webex and Google Meet) to assist the students regarding their academic difficulties?

To answer the third research question, participants were asked to select their preferences on distance learning method and describe the reason for their choice

by open-ended questions in the questionnaire. Results are summarised in Table 5 The findings below, as shown in Figure 2, indicate that 4 (5.2%) participants prefer synchronous interaction, while 43 (55.8%) prefer a combination of synchronous and asynchronous interaction and 30 (39%) prefer the synchronous method of teaching.

Table 5. Percentages of students' preference on type of online learning method

No.	Statement	n	%
B20	**Which interaction method do you prefer?**		
	Synchronous	30	39.0
	Asynchronous	4	5.2
	Combination of Synchronous and Asynchronous	43	55.8

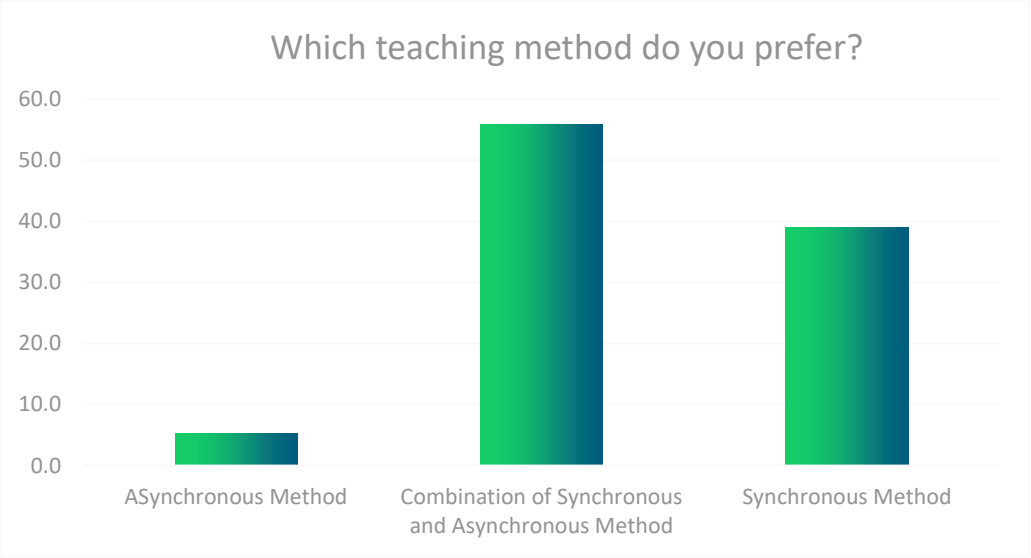

Figure 2. Teaching method preference

The findings in Table 6 show how the participants rated the synchronous learning method, which is real-time lecturer–student interactions. Most said that synchronous interaction is more important, because active learning is encouraged when courses include individual and group assignments. Moreover, 30 out of 77 respondents (39%) expressed their perceptions on exact-time online classes. As Table 7 shows, 4 out of 77 (5.2%) respondents prefer the alternating time of class. Table 8 shows that 43 students frequently choose the combination of synchronous and asynchronous learning method. Analysis results shows 55.8 percent students

choose combination method in online learning. From previous study, the descriptive analysis results show that the Blended Online Learning (Synchronous & Asynchronous) category as high perception with value of 54.49 percent impacts on student's interest [10].

Table 6. Open-ended question – synchronous learning method observation

Why do you prefer the synchronous learning method?	**n**	**%**
In-depth discussion	13	16.9
Real-time online learning as active learning, like being face to face with lecturer and classmates	7	9.1
Immediate answer from lecturer may be given	4	5.2
With proper learning system, students can chat with other groupmates	2	2.6
Mixing with classroom members and virtual modes of lectures	3	3.9
Need online classes at least 1–2 times per month	1	1.3

Table 7. Open-ended question – asynchronous learning method observation

Why do you prefer the asynchronous learning method?	**n**	**%**
Extra notes and proper pre-recorded lectures, especially calculation examples	2	2.6
Lecturer available to assist students via WhatsApp and email	2	2.6

The asynchronous method (pre-recorded lectures) for calculation topics and immediate feedback from lecturers on the difficulties raised via WhatsApp and email has been quite advantageous for distance learners. Core engineering topics related to calculation are the most critical part. Thus, they need extra guidance from the lecturer asynchronously.

Table 8. Open-ended question – combination learning method observation

Why do you prefer the combination learning method?	**Frequency**	**%**
I prefer to conduct from 8 pm onward on weekdays (Monday–Friday), try to save in recording, upload into BB for students to refresh back for self-study	5	6.5

Doing a lot of tasks that can improvise our knowledge in application or industrial	3	3.9
Time constraints due to uncertainty in working time/shift	12	15.6
It is good to do pre-recorded classes, because most probably we are working on Saturday. Prefer real-time classes on Sunday	1	1.3
We can reduce the cost of transportation and accommodation during the course with online learning	5	6.5
Video lecture before class so that those students may review before online class begins	13	16.9
Need to combine both methods so that it does not burden the students since we have to be static in front of the PC and laptop most of the day. It causes students to be less focused. It will also be burdensome, especially for subjects involving calculations. Upload the recording video in the BB, so students can review at their convenient time later	4	5.2
Total	77	100.0

While it is clear synchronous interaction is playing a larger role in the online learning environment, asynchronous interaction still has its place in distance education (Watts,2016) [11]. This study was designed to examine students' experiences and factors of the preferred method in online learning. To get the exact factors with saturated data in analysis, the interview was done by telephone and transcribed. According to Marshall and Rossman (2006), when a researcher combines transcribed interview data with an initial analysis of data, it allows for more efficiency and reflection in data analysis. Points of view have been extracted as follows:

Engineering Student 1

I prefer synchronous online learning. The virtual whiteboard with screen sharing function and enable the instructor to set up a web conference with students for better real time learning. Sometimes they could turn to asynchronous learning; recorded lectures on a series of subtopics related to the course information. However, we did not get instant feedback from the instructor by pre-recorded

lecture, so we urge use other mediums such as instant messaging, WhatsApp and talking on the phone. Nonetheless, the asynchronous learning method is convenient, especially when I'm on an outstation. There's no issues of internet coverage. There is a day I need to complete my work which I requires going to the office; therefore I might use the Wi-Fi provided in my workplace.

Engineering Student 2

Live sessions are much better. There is two-way communication instead of recording lectures with one-way communication. For example, in the environmental engineering subtopics, which cover the mathematical basis of studies, I prefer pre-recorded lectures. But for civil engineering materials for this semester with full theoretical subjects, the live session should be no problem for me. I prefer the percentages of synchronous/live sessions which involve two-way communication. Any inquiries on the topic which I couldn't understand I might ask directly to the instructor/lecturer.

Recording lectures on complex derivation topics would be helpful. The low internet connectivity in certain areas will interrupt me, so the asynchronous session would be a great solution. I may refer to the important points given by the lecturer. I prefer Blackboard Collaborate, because I manage to play the recording lecture anytime and anywhere without having to ask for the link or permission from the lecturer. Blackboard is convenient and user-friendly compared to other types of video conferencing, such as Google Meet and Webex. It is awkward for the first semester, maybe because we are not seeing each other face-to-face. But for the second semester, we get to know each other thoroughly and we can meet up outside the campus.

4. CONCLUSION

The implications of student experiences on synchronous and asynchronous online learning interaction method can be summed up as follows:

• Learning materials uploaded on the online learning platform should be organised and accessible anytime and anywhere, in case they need to go outstation on their job.
• Technical difficulties can be particularly frustrating for students who are working under time pressure to turn in homework, complete quizzes and exams or participate in discussion sessions and take notes from streaming video lectures.

• Since they are full-time employees and tied to the working schedule, asynchronous interaction with recording video and immediate guidance on the academic difficulties from lecturers are beneficial, notably for calculation-based subjects.
• Asynchronous interaction has been an important learning support to promote active synchronous participation in distance learning, whereby students prefer less time on screen and ensure to insert moments of break between presentations in real-time classes to stay in focus.
• Students should be given ample opportunity in synchronous learning to communicate with lecturers and classmates on inquiry topics to improve their understanding and enhance their performance.

Four factors influencing part-time engineering students' preferences on online distance learning are as follows: students' accommodation access to learning materials, strength and weakness aspects of online learning interaction, the nature of subjects and students' time management. The findings revealed that most part-time engineering students choose the synchronous learning method, but due to the limitation of time as a full-time employee, they tend to find their own schedule and the exact time to learn, particularly for calculation-based subject, where the asynchronous learning method would be beneficial to them. Hence, a combination of synchronous and asynchronous learning method gives distance learners satisfaction and success in an online learning environment as well as ample strategy that contributes to the university's relatively high part time mode of student's graduation rate.

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REFERENCES

[1] Madden, L., & Jones, G. (2017). Teacher education: Modes of communication within asynchronous and synchronous communication platforms. Journal of Classroom Interaction, 52, 2 p16-30

[2] Fatimah Mohd Noor & Noor Azidah Ahmad., (2012). Continuing Education for Professional Development at UTMSPACE - Experience, Development and Trends. International Conference on Teaching and Learning in Higher Education (ICTLHE2012).

[3] Cotten, S. and B. Wilson., (2006), Student-faculty Interactions: Dynamics and Determinants, Higher Education, 51, 4, pp. 487-519

[4] Nadler, M. K., & Nadler, L. B., (2000). Out-of-class communications between faculty and students: A faculty perspective. Communication Studies, 51(2), 176–188.

[5] Eric S. Belt & Patrick R. Lowenthal (2021) Video use in online and blended courses: A Qualitative Synthesis, Distance Education, 42:3, 410-440, DOI 10.1080/01587919.201

[6] Myers, S., Bishop, D., Sayee, S., and Kelly. J., (2004), Virtual Office Hours: Tutoring Students in Statistics and Economics.Proceedings of the OCDE Convergence of Libraries

[7] Schwier, R. A., and S. Balbar., (2002). The interplay of content and community in synchronous and asynchronous communication: Virtual communication in a graduate seminar. Canadian Journal of Learning and Technology 28 (2): 21-30.

[8] Cox G, Carr T and Hall M., (2004), Evaluating The Use Of Synchronous Communication In Two Blended Courses, Journal of Computer Assisted Learning, 20 (3), 183-193

[9] Marshall, C., & Rossman, G. B., (2006). Designing qualitative research (4th ed.). Thousand Oaks: Sage Publication.

[10] H.H Arfan, Misnawati, G. Sakkir, N. Puspita, Z. Akbar and Yusriadi (2019), Student learning interest in COVID-19 pandemic age by blended e-learning (Asynchronous and synchronous). 11th Annual International Conference on Industrial Engineering and Operations Management, IEOM 2021 ; : 6330-6339, 2021.

[11] Watts, L. (2016). Synchronous and asynchronous communication in distance learning: A review of the literature. Quarterly Review of Distance Education, 17(1), 23–32

A REVIEW ON THE EFFECTS OF GREEN STRATEGY ON FIRMS' ENVIRONMENTAL PERFORMANCE

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ABSTRACT - Rapid growth in the economic sector in Malaysia gives a significant effect on the environment due to the increase in pollution, waste and rapid consumption of natural resources. With the emergence of the Sustainable Development Goals (SDGs), which were adopted by all United Nations member states in 2015, firms were urged to consider environmental issues in their business processes. Environmental Management Practices (EMP) then become a part of a sustainable approach to business strategy in addressing environmental issues and enhancing the firm's environmental performance. Based on the Department of Standards Malaysia in September 2020, there were only 1,586 (0.1%) firms in Malaysia accredited with ISO 14001, which incorporates EMP. This figure reflects the low level of implementation among companies in Malaysia about the importance of a well-organized environmental management system as a part of their green strategy. The implementation of green strategy and the effects on firms' environmental performance have been discussed among researchers. This paper was intended to review the findings related to the topic based on previous research articles. The reviews will add to a growing body of literature and will help firms' management decision-making process in order to implement a green strategy for their products or services.

Keywords: Green strategy, environmental performance, sustainable development

1. INTRODUCTION

As a result of emerging environmental problems and issues, the natural environment has become a critical issue for business organizations. Most of these problems are believed to be generated by business operations, such as sourcing, manufacturing and logistics [1]. The growing concern about the environment, as well as the growing demand for environmentally friendly societies and environmentally friendly products, is forcing business industry players to consider green and sustainable approaches to their business strategy [2]. Consequently, organizations are motivated to implement a proactive approach to preserve the environment from the effects of their business activities through the overutilization

of natural resources and waste production [3]. Thus, various strategies and initiatives has been implemented such as Environmental Management Practices (EMP) and Environmental Management System (EMS) as a part of corporate green strategy in enhancing firm's environmental performance. While ISO 14001 is an international environmental standard that identifies the requirements related to the EMS and as a method to determine the environmental performance of an organization. This paper consists of two part which the first part will review on greening on business strategy and second part will discussed on the effects of green strategies and initiatives on environmental performance from previous research paper.

2. GREENING BUSINESS STRATEGY

The term 'green' in business has been a great discussion among researchers since the early 1990s. According to business dictionary, green business is defined as a business functioning in a capacity where no negative impacts are made on the local or global environment, the community, or the economy. The 'greening' of business is set to persist as more companies become aware that preventing environmental destruction by producing environmentally friendly products and technologies is a green strategic plan for risk reduction and achieving long term profitable growth [4]. A green strategy also comprises forward-thinking policies for environmental responsibility and human rights. It involves applying environmental management principles to the entire set of activities that span the customer order cycle, including design, procurement, manufacturing, assembly, packaging, logistics, and distribution [5].

The 2030 United Nation Agenda for Sustainable Development in 2015 (including 17 Sustainable Development Goals) has rising momentum for green growth globally. Apart from that, sustainability is presently becoming a very important business strategy that has a significant impact on firms' environmental performance and competitiveness. In Asia, many firms that are greening their operations are motivated mainly by external pressures exerted by government policy or foreign investors and export markets, rather than by internal considerations [6]. A number of firms are adopting Environmental Management Systems by seeking certification for their environmental practices such as ISO 14001 and participating in green business networks. Both governments and the private sector are increasingly aware of the convergence between sustainable development and market priorities, as illustrated in Figure 1 regarding green business opportunities for the private sector. Companies that are contributing to

the advancement of sustainable development grab the opportunities that are increasingly leading to strategic market advantages and positions of long-term strength. In this regard, harnessing global business as a pressure for sustainable development represents one of the biggest opportunities in the post 2015 era and a necessity for a new set development goal to be implemented [7].

Figure 1. Green Business Opportunities for The Private Sector

Source: UNESCAP (2017)

3. EFFECTS OF GREEN STRATEGY ON ENVIRONMENTAL PERFORMANCE

In general terms, environmental performance means an indicator that indicates the level of environmental protection with some measures to be taken on environmental-related activities. The main objectives of environmental performance are to optimize the use of resources, energy consumption, hazardous materials, and release of residues. ISO 14001 is an international environmental standard that identifies the requirements related to an Environmental Management System (EMS). According to the International Standard Organization (ISO, 2016), Environmental Performance Evaluation (EPE) is a process to facilitate management decisions regarding an organization's environmental performance by

selecting indicators, collecting and analyzing data, assessing information against environmental performance criteria, reporting and communicating, and periodically reviewing and improving this process. This standard consists of a plan-do-check-act method that allows top management to gather reliable information on environmental performance for the decision-making process.

Table 1 below presents a summary of previous research on green strategies and the findings related to environmental performance. A study within multinational firms in Nigeria shows that environmental performance is strongly predicted by green strategy and mediated by product quality [8]. In addition, a study in Australian organizations reveals that organization with a great extent of environmental activity management have a high level of environmental performance [9]. A study among Australian manufacturing firms found a significant association between a motivated and prepared workforce on environmental performance, which is mediated by value-creating process management and innovation processes [10]. Moreover, a study of US manufacturing firms reveals that green supply chain management (GSCM) practices improve environmental and economic performance, which leads to a positive impact on operational performance [11]. A study of UK-based manufacturing firms also discloses that EMP fully mediates the relationship between marketing capability and environmental performance [12].

In the Malaysian context, a study conducted in large manufacturing firms reported that environmental strategies mediate the relationship between green innovation and environmental performance [13]. A study among HR managers in large manufacturing firms found that green intellectual capital is an intangible resource for organizations in achieving sustainable performance [14]. An interview with three companies indicates that adopted green initiatives benefit the environment, such as a reduction in emissions and adherence to environmental standards set by the government [15]. Furthermore, a study among Malaysian firms certified with ISO 14001 reveals that EMS certification impacts positively on environmental performance [16].

Table 1. Green Strategy and Environmental Performance

Sources	Green Strategy	Outcomes / Findings
Olayeni et al. (2021)	Green strategy, product quality	Financial performance and environmental performance
Rehman et al. (2021)	Green innovation strategies	Environmental strategies mediate the relationship between green innovation and environmental performance

Yusliza et al. (2020)	Green Intellectual Capital	Green intellectual capital as an intangible resource for organizations in achieving sustainable performance
Phan, Baird, & Su (2018)	Environmental Activity Management (EAM).	Great extend of EAM leads to high level of environmental performance
Yu & Ramanathan, (2016)	Environmental Management Practices (EMP)	Environmental performance
Kirsten et al. (2015)	Motivated and prepared workforce and environmental performance.	Significant associations between affective commitment, employee performance process and training and enhanced environmental performance
Green et al. (2012)	Green Supply Chain Management	Environmental performance, economic performance and organizational performance
Eltayeb & Zailani (2010)	Eco-design, green purchasing, reverse logistics, environmental collaboration	Environmental benefits
Ann, Zailani, & Wahid (2006)	Environmental Management System (EMS)	EMS certification positively impacts on environmental and economic performance

4. CONCLUSION

This paper provides a review of previous literature on green strategy and the effects on environmental performance. From previous studies, green strategy and initiatives have significant effects on the environmental performance of firms. However, most of the studies focused on manufacturing firms. Hence, the study should be expanded to include other industries that have an impact on the environment. Furthermore, the aspect of environmental performance can be further discussed in terms of monetary and non-monetary units. Different measurement models and contexts can be explored for further study on green strategy and environmental performance. Finally, this research will assist organizations in better understanding and implementing green strategies on their products or services in order to improve their environmental performance.

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REFERENCES

[1] Benita M Beamon. (1999). Designing the Green Supply Chain. *Logistics Information Management*. https://doi.org/10.1108/09576059910284159

[2] Seidel, S., Recker, J., & Vom Brocke, J. (2012). Green business process management. In *Green Business Process Management: Towards the Sustainable Enterprise*. https://doi.org/10.1007/978-3-642-27488-6_1

[3] Singjai, K., Winata, L., & Kummer, T. (2018). International Journal of Hospitality Management Green initiatives and their competitive advantage for the hotel industry in developing countries. *International Journal of Hospitality Management*, *75*(March), 131–143. https://doi.org/10.1016/j.ijhm.2018.03.007

[4] Roarty, M. (1997). Greening business in a market economy. European Business Review. https://doi.org/10.1108/09555349710179898

[5] Zsidisin, G. A., & Siferd, S. P. (2001). Environmental purchasing: A framework for theory development. European Journal of Purchasing and Supply Management. https://doi.org/10.1016/S0969-7012(00)00007-1

[6] ADB. (2018). *Business of Greening: Policy Measures for Green Business Development in*
Asia. (59).

[7] Source: UNESCAP (2017) Overview of Green Business. Enabling Policies and Private Sector Examples. Economic and Social Commission for Asia and the Pacific.

[8] Olayeni, A.; Ogbo, A.; Okwo, H.; Chukwu, B.; Ifediora, C.; Ezenwakwelu, C. (2021). Green Strategy Effect on Financial and Environmental Performance: A Mediation Analysis of Product Quality. Sustainability 2021, 13, 2115. https://doi.org/10.3390/su13042115.

[9] Phan, T. N., Baird, K., & Su, S. (2018). Environmental activity management: its use and impact on environmental performance. *Accounting, Auditing and Accountability Journal*, *31*(2), 651–673. https://doi.org/10.1108/AAAJ-08-2016-2686

[10] Kirsten Rae John Sands David Leslie Gadenne, (2015). "Associations between organisations' motivated workforce and environmental performance",

Journal of Accounting & Organizational Change, Vol. 11 Iss 3 pp. 384 - 405

[11] Green, K. W., Zelbst, P. J., Meacham, J., & Bhadauria, V. S. (2012). Green supply chain management practices: Impact on performance. Supply Chain Management, 17(3), 290–305. https://doi.org/10.1108/13598541211227126

[12] Yu, W., & Ramanathan, R. (2016). Environmental management practices and environmental performance the roles of operations and marketing capabilities. Industrial Management and Data Systems. https://doi.org/10.1108/IMDS-09-2015-0380

[13] S. U. Rehman, S. Kraus, S. A. Shah, D. Khanin, R. V. Mahtoe (2021). Analyzing the relationship between green innovation and environmental performance in large manufacturing firms. Technological Forecasting and Social Change 163, Article 120481

[14] M-Y Yusliza, Jing Yi Yong, M. Imran Tanveer, T. Ramayah, Juhari Noor Faezah, Zikri Muhammad (2020). A structural model of the impact of green intellectual capital on sustainable performance, Journal of Cleaner Production,Volume 249, 119334, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2019.119334.

[15] Eltayeb, T. K., Zailani, S., & Filho, W. L. (2010). Green business among certified companies in Malaysia towards environmental sustainability: Benchmarking on the drivers, initiatives and outcomes. *International Journal of Environmental Technology and Management*, *12*(1), 95–125. https://doi.org/10.1504/IJETM.2010.029983

[16] Ann, G. E., Zailani, S., & Wahid, N. A. (2006). A study on the impact of environmental management system (EMS) certification towards firms' performance in Malaysia. *Management of Environmental Quality: An International Journal*. https://doi.org/10.1108/14777830610639459

GREEN CAMPUS AWARENESS AMONG DIPLOMA STUDENTS IN UTM KUALA LUMPUR: PRELIMINARY INVESTIGATION

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ABSTRACT - Towards the end of 2014, Universiti Teknologi Malaysia has made its fourth entry into the UI World Universities Ranking Base on Green Metric – an international ranking system of universities from around the world based on their environmental performance. The UI Green Metric World University Ranking measures the university's effort to keep the environment green and sustainable, and the ranking purpose and intended groups. The motivation spread among the UTMSPACE community needs to be enhanced in order to create a balanced understanding of the campus sustainability highlighted by UTM. Apart from that, it is important to determine the level of green awareness among the UTMSPACE community and find effective green approaches in order to increase green awareness in the campus community. Therefore, a preliminary investigation was done among Diploma students from the Centre for Diploma Studies, SPACE UTM Kuala Lumpur. From 132 students, only 43 (32.6%) have participated in the green awareness campaign and 57 (43.2%) of them agree that green awareness implementation in UTMKL Campus is at a moderate level. The survey also includes suggestions for increasing green awareness through social media campaigns, encouraging the younger generation through education through video, games, and competitions, and developing a mobile app for green reward points.

Keywords: Green campus, green awareness, sustainable campus

1. INTRODUCTION

Green Campus awareness has significantly gained momentum since the declaration on Sustainability in Higher Education (SHE) during The Stockholm Declaration, 1972. The declaration urged to focused on finding ways in which universities, their leaders, lecturers, researchers, and students can engage their resources in responding to the challenges of balancing between economic and technological development with environmental preservation [1]. Practices and tools were designed related to environmental preservation. In addition, the term “greening” of classes and teaching courses has recently emerged as future

enterprises which intended to green education, such as green schools and universities [2].

A sustainable university is defined as a higher educational institution, as a whole or in part, that addresses, involves, and promotes, on a regional or global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of its resources in order to fulfil its functions of teaching, research, outreach and partnership, and stewardship in ways that assist society in making the transition to sustainable lifestyles [3]. It also focused on the educational process with the techniques, applications, strategies, and practices associated with the concept of green education, and many countries have started to adopt it in their institutions and educational systems. [4].

UTM enVision 2025 emphasized their strategic priorities, which include inculcating UTM core values such as integrity, synergy, excellence, and sustainability into the work and management ecosystem. It also outlined the vision of providing a sustainable campus experience to UTM's students, staff and surrounding community. Apart from that, UTM Sustainable Campus has played a critical role in enabling the institution to function as a sustainable community that practises responsible resource consumption and waste management. It also serves as a sustainability research centre, bringing together experts from diverse disciplines to better understand and address issues linked to sustainability on a local, national, and international scale [5]. Therefore, the awareness among UTMKL students comes across as the highlight of the research, which allows UTM and UTMSPACE to understand the awareness levels of different backgrounds of students and bring in the correct methods to enhance their green awareness as well as increase their participation in green campaigns and programmes.

2. MATERIALS AND METHODS

An online survey was conducted through Google form with a total of 132 students from the Centre for Diploma Studies, SPACE UTM and they consist of different backgrounds. The brief questions are intended to identify on students' green awareness and their participated in prior campaigns. The students are then asked on how they have done with the campaigns. In addition, through this survey we ask students on their suggestions on how to increase green awareness through online application. At the end of the survey, students have to rank the level of green awareness implementation in campus. The data was analysed in a

descriptive manner, with the percentages that each question yielded included. The results of this preliminary investigation are very important in order to understand students' green consciousness and obtain input from them on how to enhance green awareness on campus. With the various techniques and tools of environmental knowledge, this may lead to personal behavioural changes and raise green awareness [6].

3. RESULTS AND DISCUSSION

From the total of respondents, 63 (47.7%) are female students and 69 (52.3%) are male students. The results in Figure 1 show that 93 (70.5%) of the respondents are aware of green awareness campaigns, while 39 (29.5%) are unaware. As a result, we may deduce that the majority of students are well-versed in environmental consciousness. However, the results given in Figure 2 show that only 43 (32.6%) of them have participated in green awareness campaigns, while 50 (37.9%) have not participated and 39 (29.5%) were not sure. This result shows an indicator that green awareness needs to be widely engaged among students and the campus community.

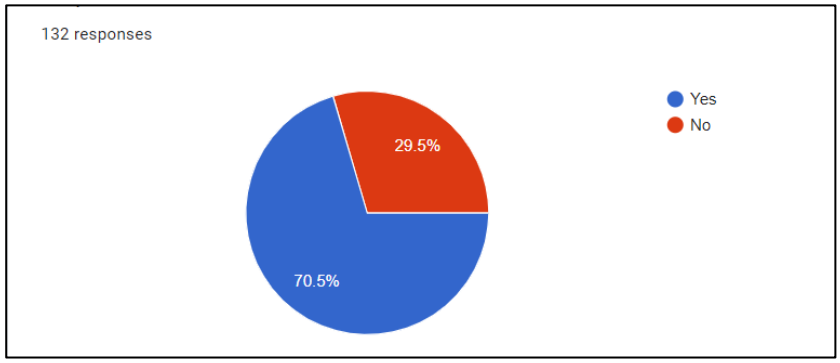

Figure 1. Students' Green Awareness

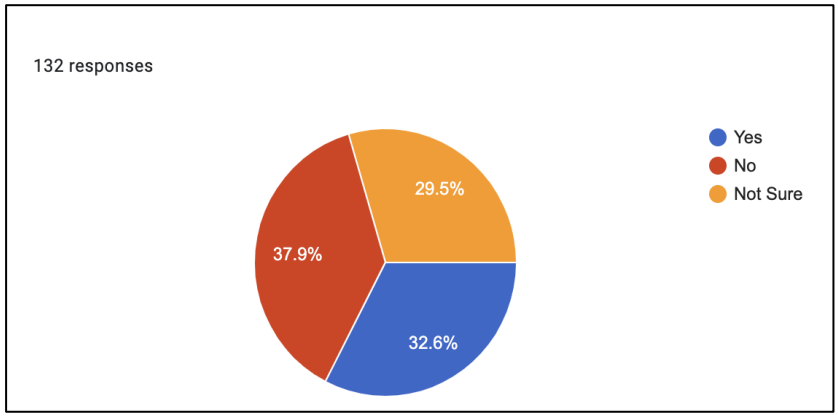

Figure 2. Students' Green Awareness Campaign Participation

The result in Figure 3 shows that 68 (51.5%) of students are inclined to participate in the campaign with their self-motivation activities such as recycling items on their own. 44 (33.3%) of the students are inclined to participate in community activities, while 22 (16.7%) prefer to be involved in an online campaign, and another 14 (10.6%) are inclined to participate in a green campaign event. From these findings, we can conclude that students are more likely to self-motivate themselves to engage in green activities.

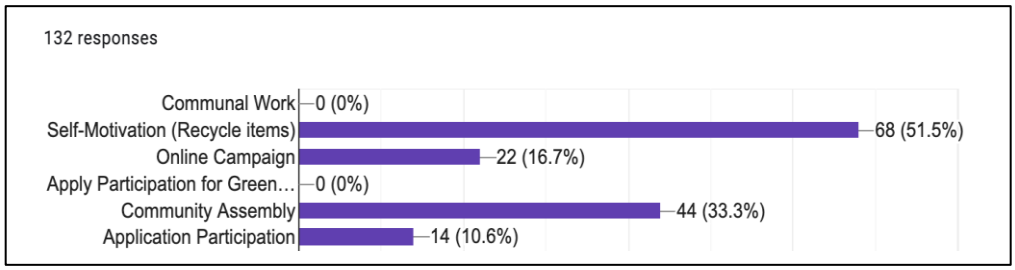

Figure 3. Types of Campaigns Participated by Students

Figure 4 below shows the results for the level of green awareness implementation perceived by students on campus was at a moderate level, which is represented by 57 (43.2%) of respondents. 39 (29.5%) of respondents rated the level of green awareness as good and 31 (23.5%) rated it as excellent. While 5 (3.8%) claimed that the green awareness on campus was at a poor level. Apart from this survey, we compiled a list of respondents' suggestions on how to increase green awareness on campus. Some of their suggestions are to create awareness through online

campaigns on social media, video competitions, forums and conferences, green reward points, games and quizzes, and many more.

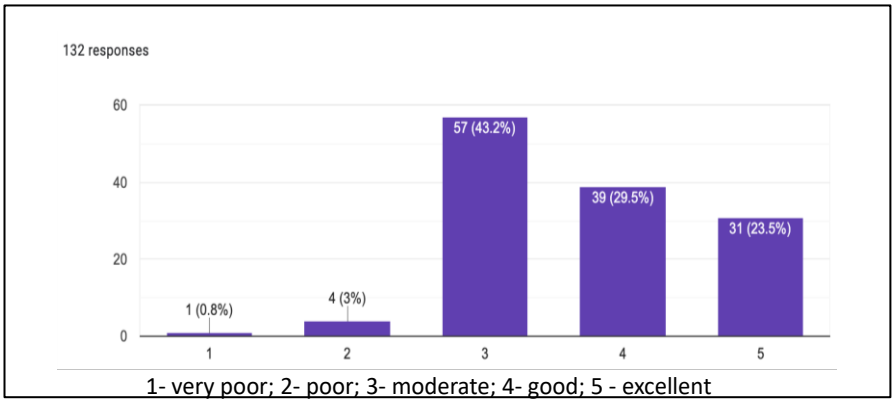

Figure 4. Green Awareness Implementation Level on Campus

4. CONCLUSION

From this preliminary survey, we can conclude that green awareness at UTMKL campus is at a moderate level among the campus community, especially students, whereby their engagement in green awareness campaigns is still low. Apart from that, from suggestions given by students, we noticed that students were inclined to participate in green awareness campaigns through online media and using digital platforms such as mobile apps. This supports research findings from a survey conducted among Ericsson employees at its headquarters in Kista Campus, Sweden, that stated digital applications are a major player in fostering sustainability in the workplace by changing behaviour and raising green awareness [7].

ACKNOWLEDGEMENT

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REFERENCES

[1]. Grindsted, Thomas and Holm, Tove, Thematic Development of Declarations on Sustainability in Higher Education (April 1, 2012). Environmental Economics, Volume 3, Issue 1, 2012.

[2]. Alshuwaikhat, Habib & Rimi Abubakar, Ismaila. (2008). An integrated approach to achieving campus sustainability: assessment of the current campus environmental management practices. Journal of Cleaner Production. 16. 1777-1785. 10.1016/j.jclepro.2007.12.002.

[3]. Velazquez Contreras, L. (2002),"Sustainable universities around the world: a model for fostering sustainable university program's effectiveness", Doctoral dissertation, University of Massachusetts Lowell, Lowell, MA.

[4]. Grindsted, Thomas, Sustainable Universities – From Declarations on Sustainability in Higher Education to National Law (December 1, 2011). Environmental Economics, Volume 2, Issue 2, 2011.

[5]. UTM, https://utm.my/sustainable

[6]. Michalos, Alex C., et al. "Measuring knowledge, attitudes and behaviours towards sustainable development: Two exploratory studies." International Institute for Sustainable Development, Manitoba (2009).

[7]. Lo, Yuan-Yin. "Creating a sustainable campus through digitalization: Exploring workplace practices to increase employee engagement." (2019).

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DEVELOPMENT OF *MECHYAR* APPS FOR LEARNING MECHANICAL DESIGN

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ABSTRACT - The development of the *MechyAR* application is a new way of learning that is aimed at improving current learning. This application was created to make it easier for students to learn mechanical components by utilizing current technology. The primary objective of this study is to identify appropriate multimedia elements for use in the application development, to develop the application, and to test the functionality of the *MechyAR* application as a new virtual learning method that employs virtual technology. Questionnaires were distributed to Design and Technology subject teachers to identify appropriate multimedia elements to be used in application development. The data were analyzed using SPSS 25.0 which are then used as a guide for the researcher to develop *MechyAR* application. The Prototype Development Model was used as a guide in developing and implementing the *MechyAR* application. This application was evaluated by experts based on their teaching experiences in the field of multimedia technology. From the findings, multimedia elements namely graphics, animation, video, and audio are important elements that need to be applied in the newly developed *MechyAR* application. Furthermore, experts agreed and supported the development of this application to be used as a new method of student learning for the Design and Technology subject, particularly the Mechanical Design topic. Overall, the application of mechanical learning characterized by Augmented Reality can be concluded to be functional and suitable for use as an initial exposure for student learning in academic secondary school.

Keywords: design and technology, mechanical design, multimedia elements

1. INTRODUCTION

Many countries' administrative systems, organization, and efficiency have improved because of technological advancements. Technological advancements have simplified the navigation of administration, management, broadcasting and media, telecommunications and communications, and education, among other fields. As such, our country's educational system is undergoing rapid transformation. Advances in technology can also be seen in the field of education, where computer-assisted teaching and learning methods were introduced and

enhanced to be at par with the current level of technological development and to produce a holistic generation that is well-versed not only in academics but also in technological knowledge [1]. Educators have introduced and used a variety of new methods and techniques to improve the effectiveness and efficiency of the teaching process. In this era of rapid globalization, it is expected every student to have a set of skills that includes basic academic skills, critical thinking, problem-solving abilities, the ability to work in groups, the ability to use technology, and the ability to communicate effectively [2]. Educators must be capable of effectively teaching and learning for students to be born capable of contributing to the nation's and country's development.

Therefore, the chalk and talk method is no longer compatible with the 21st Century Teaching and Learning concept, which promotes student-centred learning rather than teacher-centred learning. Learning will be more engaging and effective if teachers are able to incorporate a variety of appropriate methods and techniques, depending on the lesson's objectives. According to many studies [3,4,5] competence refers to an educator's capacity to comprehend, behave, evaluate, make decisions, and act in the course of their duties. To conduct student-centred learning, today's education requires teachers to act as facilitators. This is to ensure that students can work in groups and apply their inquisitiveness to their learning. Student-centred learning can provide a fun new learning experience for students [6] and encourage them to self-explore the topics being studied [7]. Additionally, previous research has highlighted how student-centred learning and student learning outcomes can be improved through the use of Augmented Reality applications, an exciting new technology that enables users to examine virtual objects learned in class [8, 9].

Augmented Reality (AR) is a new technology that not only helps increase the perception of teaching dynamics but can also incorporate sensory modalities such as touch, sight, and hearing [10,11]. Specific to adding a variety of sensory modalities, there are many researchers revealing potential benefits of using AR in formal education such as improving student academic achievement [12], knowledge retention [11] and engagement [13] to achieve critical learning outcomes during the teaching -learning process. Previous research suggests that educators should use cutting-edge and advanced technology applications, such as Augmented Reality. Furthermore, it was reported that AR has a lot of potential to change educational settings such as improving progressive pedagogy, teaching strategies, classroom arrangement, and content delivery [14]. The use of augmented reality applications is expected to improve students' cognition and interaction, resulting in more effective learning [15].

In one study, traditional 2D and 2D simulation systems were compared to see if such systems resulted in better learning among university students. AR simulations, according to the researchers, play a more supportive role in students' collaborative learning than traditional learning [16]. In a comparative media study, the researchers investigated how different forms of technological mediation (computers vs. robots) might impact kindergarten students 'perceptions of AR-infused teaching and learning. The results show that regardless of the type of media, younger children tend to have higher satisfaction with AR-infused learning content [17]. A study by [18] compared the teaching effectiveness of location -based AR navigation tools with Google maps and print -based materials among students diagnosed with intellectual disabilities or autism spectrum disorders. The researchers discovered that when students used location-based augmented reality navigation tools, their performance improved significantly compared to when they used traditional learning materials [18].

1.1 Statement of Problem

In 2017, the Secondary School Standard Curriculum (KSSM) was implemented in stages to replace the Integrated Secondary School Curriculum (KBSM) as a transformation process in the field of education. As a result, a new subject, the Design and Technology has been added to the new curriculum to replace the Living Skills subject. The Design and Technology teachers were found to be unprepared in terms of planning, implementing, and assessing RBT-based learning in secondary schools. This is due to the teacher's constraint, as their teacher-training background and teaching experience is limited to the Living Skills area [19,20,21]. According to previous studies [22,23], changes in curriculum may cause a slew of issues for teachers. Teachers are required to attend time-consuming meetings and workshops, which interfere with their ability to focus during the teaching process, jeopardizing the effectiveness of their classroom instruction.

The teaching content of Design and Technology for Form 2 consists of two main topics, namely Inventive Problem Solving (Topic 1) and Technology Application (Topic 2). The current study focuses on Topic 2 which is the Technology Applications and is further focused on the subtopic of Mechanical Design. The objective in the Mechanical Design subtopic is to expose students to mechanical components, component functions, 3D sketches of project or gadget design, component suitability on gadgets, weaknesses, and strengths of components on gadget systems, building functional mechanical gadgets and improvements that can be made to the gadget system. Students are assessed through project assignments where they are required to develop gadgets based on what is learned in this Mechanical Design subtopic.

As a result, the use of textbooks solely as reference material in teaching and learning is inadequate to help students gain a better understanding of mechanical components, component functions, and how to apply those components in the development of their gadgets, as Mechanical Design is a new learning topic for them. Teachers should therefore employ a variety of approaches, methods, and techniques to assist students in learning the concept of Mechanical Design. However, the Design and Technology teachers face challenges due to a lack of tools and facilities [24, 25]. According to [26, 27], multimedia software with elements such as graphics, animation, video, and audio can stimulate and attract students while also assisting in the delivery of lesson content. The incorporation of technological software or multimedia elements into the teaching and learning process can assist students in acquiring knowledge in a more realistic and visual manner. This can also help students understand real-world systems like mechanical systems, which are covered in the subtopic of Mechanical Design topic in Design and Technology subject for Form 2 students in academic secondary schools.

Thus, research on the development of augmented reality applications as well as multimedia elements suitable for use in augmented reality applications is critical to assisting in the development of interactive teaching aids that can be used in complex topics such as Mechanical Components in the Design and Technology subject in academic secondary schools. The development of this augmented reality application demonstrates that the application of teaching techniques is appropriate and consistent with the governing concept of 21st Century Teaching and Learning.

1.2 Study Objective

In general, the purpose of this study is to investigate the appropriate multimedia elements deemed important to be included in the development of the *MechyAR* application. The development of this application aimed at assisting Design and Technology teachers in carrying out a more effective and efficient teaching and learning process, which may engage more active students' participation in the classroom process. The specific objectives of this study are:

i. Identify the appropriate multimedia elements in the development of *MechyAR* application for the Mechanical Design topic in Design and Technology subject
ii. Designing the *MechyAR* application featuring Augmented Reality
iii. Identify expert views on the usability of *MechyAR* application

2. MATERIALS AND METHODS

The primary objective of this study is to create a learning media for the Design and Technology subject, with a particular emphasis on the Mechanical Design topic, by incorporating a prototyping development model with augmented reality. The Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model was utilized in this study. The ADDIE model's development procedures are divided into five stages: analysis, design, development, implementation, and evaluation [28, 29]. Figure 1 depicts the stages of the ADDIE model.

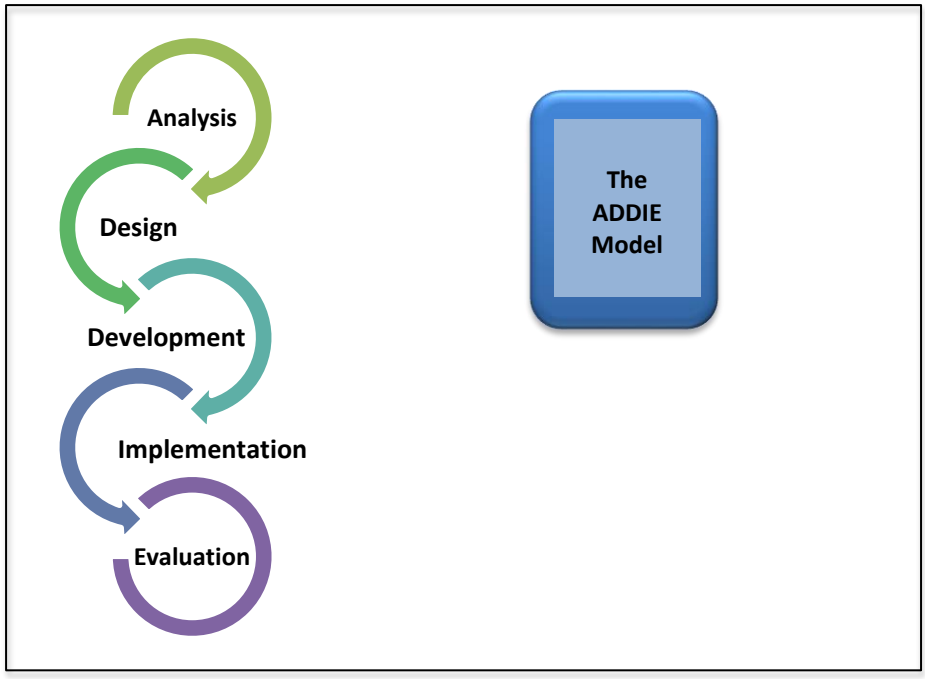


Figure 1. Stages of the ADDIE model

Further, Figure 2 depicts the functional flow chart to outline the development process of *MechyAR*, an augmented reality learning application development.

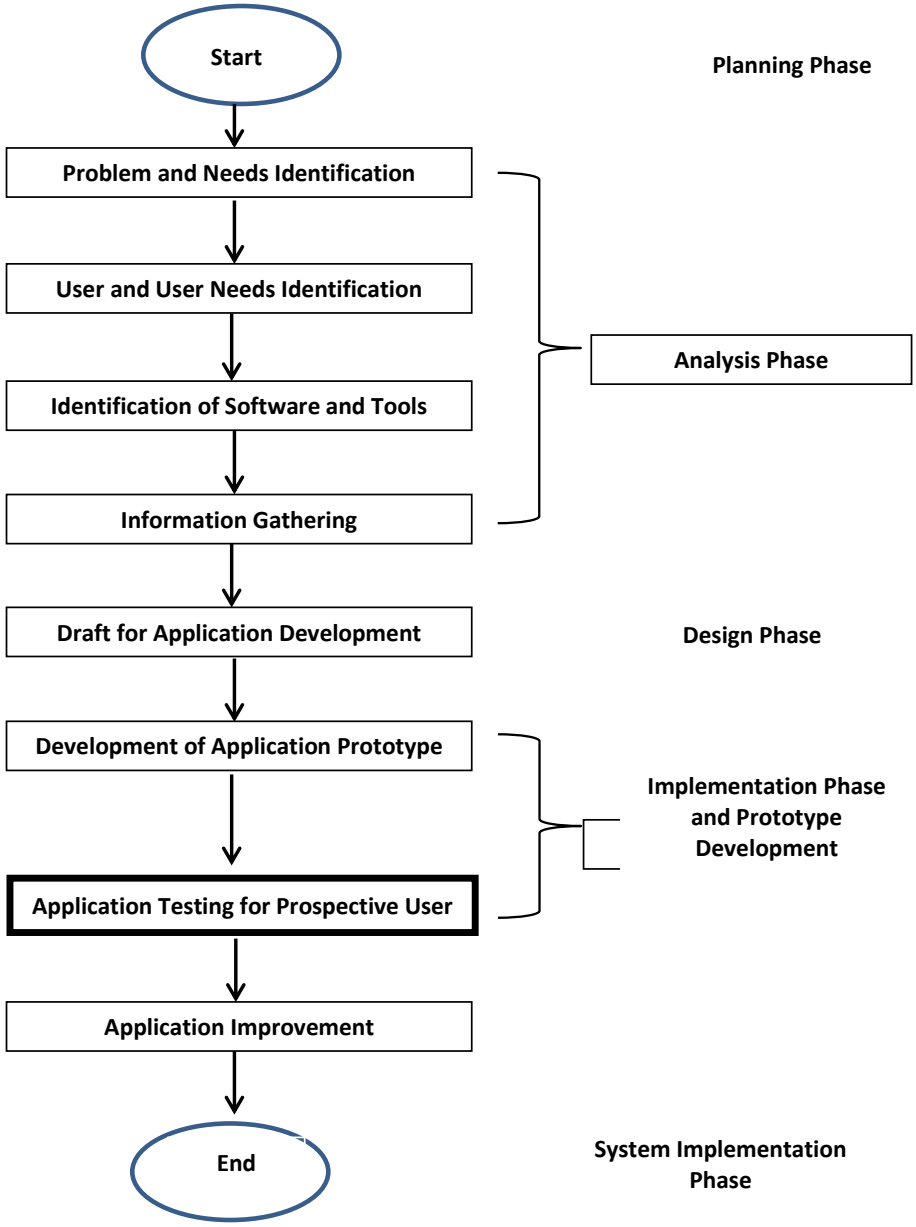


Figure 2. Study flowchart

2.1 Planning Phase

This application was developed using a prototype development model. The developer determines the objectives of the application to be developed, the background of the problem, the knowledge required in developing this application, the target users, and the scope of the study during the planning phase. Developers also determine the hardware, software, and related knowledge requirements. Each of these requirements must be applicable to the application development. Laptops and other software such as Unity 3D, Vofuria, and Balabolka are required to build graphic, animation, and audio elements for *MechyAR* "Mechanical Learning" applications. In addition, the developer also uses android mobile phones to display the AR for which this application is set for all android mobile phones up to 4.0 and beyond

2.2 Analysis Phase

This phase entails gathering information to develop the application, analyzing the information based on the suitability of the application and deciding how to implement it. During the analysis phase, product requirements are explained in detail by researchers interviewing targeted users to gather the information needed to meet their needs. Following that, the developer distribute instrument to secondary school teachers who teaches Design and Technology subject. Research instruments are tools used by researchers to collect data to obtain information prior to the development of a product. This study employs a quantitative approach by distributing questionnaires to Form 2 Design and Technology teachers from six national secondary schools in Skudai, Johor. The survey results are used to guide and assist in understanding the project's needs and achieving project objectives.

2.3 Design Phase

Following the analysis phase, the developer created this AR application by first creating a flash card on mechanical components using free online resources. Mechanical components can be found from any device, piece of equipment, or vehicle. The image in the figure depicts the 3D image obtained from the searched site.

Figure 3. 3D model sample

The developer then designs the product for the design phase by creating a "Story Board" with the information obtained so that the developer can get an overview of the product that is to be developed. This application development strategy has been thoroughly examined to ensure that it satisfies the requirements for developing this application. If no resources are obtained from the website, the developer must also know how to build 3D objects at this stage. The developer compiles all product materials and then edits them using software during the implementation phase. The prototype development phase was extended by utilizing materials already on-site. After the prototype is created, it is tested by giving it to a user. Following that, the developer creates the product design using Utility 3D and Vuforia.

2.4 Implementation and Prototype Phase

This implementation phase involves the process of finding 3D objects and designing markers that will be used in the application. Figure 4 below shows the main page of the AR application that was developed in this application. On this page there are three menu options which are “start”, “instruction” and “about” before user can start the application to the next screen.

Figure 4. Application main menu

When the user presses the ENTER button, the application will navigate to the next page as shown in Figure 5. There will be two options on this site: DOWNLOAD and CAMERA. For the CAMERA, the lens will scan the flash card, and the 3D model will be projected on the smartphone screen. When the user clicks DOWNLOAD, user will be able to obtain the flash card resource for use with this application.

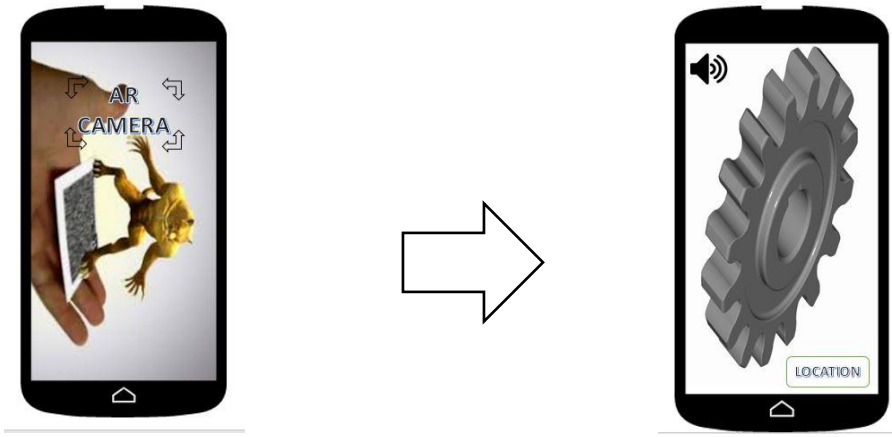


Figure 5. Example of AR CAMERA and 3D Model sample on screen

When the user scans the flash card, the 3D model appears, along with text indicating the component's name and audio describing its function. The mechanical component can be found by pressing the LOCATION button (Figure 6). The diagram depicts a static image of the location of the mechanical component in the mechanical tool.

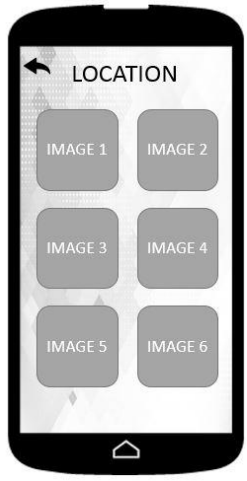


Figure 6. Example of image arrangement for location where the mechanical components can be found

2.5 Implementation and System Phase

This augmented reality mechanical learning application has been tested to ensure that it meets the needs of users while also meeting the developer's objectives. Products are amended and revised in response to testing comments and evaluations based on expert judgment process. Expert teachers were selected based on their years of experience in the teaching and learning of Mechanical Design subject. Finally, once this application has been successfully developed, the developer documented the benefits and drawbacks of mechanical learning using this AR application for use as a reference and guide for future improvement.

3. RESULTS AND DISCUSSION

3.1 Objective 1: Identify the appropriate multimedia elements for *MechyAR* application

A survey among teachers was conducted to identify appropriate multimedia elements for use in the application development. Questionnaires were distributed to Design and Technology subject teachers to identify appropriate multimedia elements to be used in application development. The data were analyzed using SPSS 25.0 which are then used as a guide for the researcher to develop *MechyAR* application.

Demographic Profile

The total number of subject-matter experts involved in this study is a total of 33 Design and Technology teachers consisting of seven (7) male teachers and twenty-six (26) female teachers from academic secondary schools in Skudai, Johor (see Table 1).

Table 1. Distribution of respondents teaching experience

Years of experience	Frequency (f)	Percentage (%)
1 – 5 years	5	15.2
5 -10 years	14	42.4
More than 11 years	14	42.4
Total	33	100

Table 2. Mean Value and Standard Deviation of Each Element

Element	Mean Score	Standard Deviation	Level
Graphic	4.33	0.475	High
Animation	4.34	0.485	High
Video	4.27	0.447	High
Audio	4.24	0.447	High

Based on Table 2, all elements are suitable for inclusion in the application development with high mean scores, indicating a high level of agreement. The animation element is the most dominant, followed by the graphic element, the video element, and finally the audio element. This signifies the importance of these elements to be used in the development of *MechyAR* application for the Mechanical Design topic in the Design and Technology Form 2 teaching content. The result is in line with previous studies [30] which found that hypermedia elements such as animation, sound, graphics, hypertext, and color made the presentation more engaging and able to increase students' engagement. Multimedia in education improves learning efficiency and makes it easier to describe what needs to be conveyed. Additionally, a screen can display text, audio, video, and animation in a variety of colors and patterns simultaneously as a positive and effective communication medium. Multimedia can be used to convey information quickly and accurately, as well as act as an attractant to create a fun learning environment. [31, 32].

3.2 Objective 2: The development of *MechyAR* - a mechanical component learning application featuring Augmented Reality

This application was developed using software and hardware (i.e., Unity, Vuforia and Balabolka) that were selected to aid researcher in the development process. Additionally, a user manual is being developed to assist teachers in implementing *MechyAR* during the teaching and learning process. Teachers can also use this application with a laptop or computer equipped with a webcam. LCD display is also required to ensure that the screen is visible to all students during the teaching and learning process. This is to facilitate teachers' use of the application in the classroom.

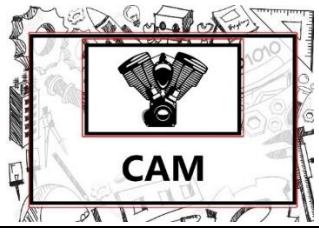
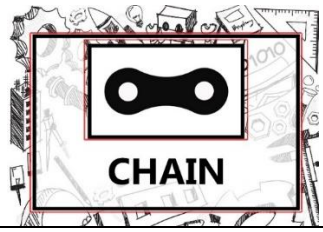
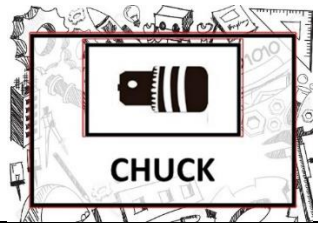
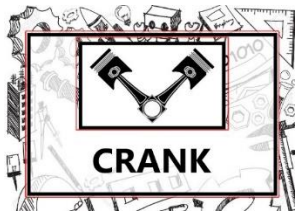
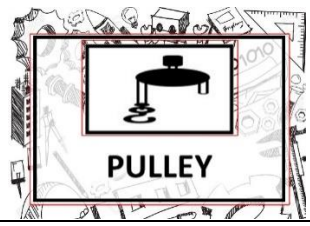
Studies in augmented reality and learning autonomy shows that students will have the ability to receive information better if using a combination of information approach in the form of images, graphics, audio, video, and animation [33,34]. The content in this *MechyAR* application combines these five multimedia elements to help the learning process of students. The content is designed to assist users in

becoming more effective and efficient during the teaching and learning process. Inconsistent content organization will influence both the teaching and learning outcomes of students and teachers. Therefore, the design phase is crucial as an overview about the overall product, structure, teaching approach, type of multimedia elements and technology used.

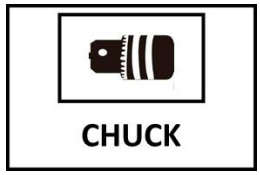
The front page of *MechyAR* application's user manual features the title of the mechanical component, and a suitable background image. The next flash card contains an instruction manual that will teach the user how to use this application. The following page serves as an introduction to mechanical components. Each marker on the flash card will be scanned by the user. There are ten (10) mechanical component flash cards that display 3D objects and explain the function of those mechanical components. Each 3D component display includes an image of the component object and a video demonstration of the component in action. The flash card will be included in the *MechyAR* application's user manual (see Table 3.

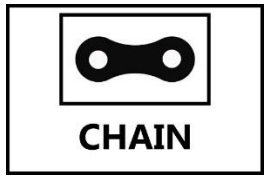
Systematic planning is critical to achieving the highest possible product quality. Each software package should be thoroughly examined prior to developing a product. To avoid issues, the design process must be organized. The multimedia and augmented reality elements included in the application, as well as the user manual, should be engaging to pique users' interest and aid teachers' comprehension of how to use it [35].

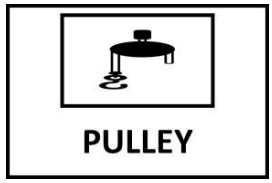
Table 3. List of *Flash card* and *Marker* for *MechyAR* application

Flash card for *MechyAR* application	
	
	
	
	
	

List of *Marker* for *MechyAR* application







3.3 Objective 3: Usability of *MechyAR* application

The aim is to test the functionality of the *MechyAR* application as a new virtual learning method that employs virtual technology in the teaching and learning of Mechanical Design topic in Design and Technology subject. Experts evaluated the application's usability positively based on the analysis. However, there is a little drawback to this application: the conversion to the camera scene is quite slow, and the image of the mechanical component, for example, is less clear on some 3D

components of the object. The conversion to the camera scene is found to be slow due to the presence of numerous 3D objects in a single interface. Such vulnerabilities can be controlled by the developer by reducing 3D objects in the same interface. In general, the displayed 3D objects, animations, graphics, audio, and video are all functional. Based on expert consensus regarding *MechyAR* application functionality, the application can function properly and completely within the scope of the project, achieving the project's objectives. According to experts, this application can assist students in identifying these mechanical components as well as their function. Table 4 presents the expert's feedback on the application usability.

Table 4. Expert Opinion on Usability of *MechyAR* application

No	Item: Content	Expert 1	Expert 2	Expert 3
1	The name of the 3D object component is displayed on the screen while the marker is scanned on the mechanical component flash card	/	/	/
2	The 3D object helps the students recognize the mechanical component	/	/	/
3	The displayed images in the MechyAR Augmented Reality application are easily identified	/	/	/
4	Videos on the functions of mechanical component is appropriate and easily understood	/	/	/

A simple, user-friendly, and less technical augmented reality authoring tool that is also responsive to the needs of teachers is critical to enabling the expansion of technology use in education [36].

4. CONCLUSION

Overall, this study aims to examine the appropriate multimedia elements to be taken into consideration when designing the *MechyAR* application for Mechanical Design topic in Design and Technology subject for secondary schools. The data gathered indicates that graphic, video, animation, and audio elements are all suitable for inclusion in the development of AR-enabled applications. Following the completion of the *MechyAR* application development, experts who have tested and evaluated the *MechyAR* application have made some observations and suggestions. The user experience testing resulted in a positive result, indicating

that this virtual reality-based learning media application was deemed outstanding. As a result, this application could be used as a supplement to the teaching and learning process in an academic secondary school for the subject of Design and Technology, with a focus on Mechanical Design.

ACKNOWLEDGEMENT

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REFERENCES

[1] Abdurakhmanova, G., Shayusupova, N., Irmatova, A., & Rustamov, D. (2020). The role of the digital economy in the development of the human capital market. *Архив научных исследований*, (25).
[2] Escueta, M., Quan, V., Nickow, A. J., & Oreopoulos, P. (2017). Education technology: An evidence-based review.
[3] Watson, L. (2019). Educating for inquisitiveness: A case against exemplarism for intellectual character education. *Journal of Moral Education*, *48*(3), 303-315.
[4] Mullins, N. M., Michaliszyn, S. F., Kelly-Miller, N., & Groll, L. (2019). Elementary school classroom physical activity breaks: Student, teacher, and facilitator perspectives. *Advances in physiology education*, *43*(2), 140-148.
[5] Borup, J., Chambers, C. B., & Stimson, R. (2019). Online teacher and on-site facilitator perceptions of parental engagement at a supplemental virtual high school. *The International Review of Research in Open and Distributed Learning*, *20*(2).
[6] Benlahcene, A., Lashari, S. A., Lashari, T. A., Shehzad, M. W., & Deli, W. (2020). Exploring the Perception of Students Using Student-Centered Learning Approach in a Malaysian Public University. *International Journal of Higher Education*, *9*(1), 204-217.
[7] Rollakanti, C. R., Naidu, V. R., Manchiryal, R. K., & Poloju, K. K. (2020). Technology-Assisted Student-Centered Learning for Civil Engineering Students. In *Sustainable Development and Social Responsibility—Volume 1* (pp. 179-185). Springer, Cham.
[8] Mavromihales, M., Holmes, V., & Racasan, R. (2019). Game-based learning in mechanical engineering education: Case study of games-based learning application in computer aided design assembly. *International Journal of Mechanical Engineering Education*, *47*(2), 156-179.
[9] Pamungkas, S. F., & Widiastuti, I. (2021). Vocational Student's Attitude and Response Towards Experiential Learning in Mechanical Engineering. *Open Engineering*, *11*(1), 254-268.

[10] Thornton, T., Ernst, J. V., & Clark, A. C. (2012. (n.d.). Augmented Reality as a visual and spatial learning tool in technology education. Technology and Engineering Teacher, 71(8), 18-21.
[11] Pérez-López, D., & Contero, M. (2013. (n.d.). Delivering educational multimedia contents through an Augmented Reality application: A case study on its impact on knowledge acquisition and retention. TOJET: The Turkish Online Journal of Educational Technology, 12(4), 19-28.
[12] Estapa, A., & Nadolny, L. (2015. (n.d.). *The Effect of an Augmented Reality Enhanced Mathematics Lesson on Student Achievement and Motivation*. Journal of STEM Education: Innovations and Research, 16(3), 40.
[13] Bressler, D. M., & Bodzin, A. M. (2013. (n.d.). A mixed methods assessment of students' flow experiences during a mobile Augmented Reality science game. Journal of Computer Assisted Learning, 29(6), 505-during a mobile Augmented Reality science game. Journal of Computer Assisted Learning, 29(6), . 505-517.
[14] Johnson, L., Adams Becker, S., Estrada, V., and Freeman, A. (2015. (n.d.). NMC Horizon Report: 2015 K-12 Edition. Austin, Texas: *The New Media Consortium.*
[15] Lu, S. J., & Liu, Y. C. (2015. (n.d.). Integrating Augmented Reality technology to enhance children's learning in marine education. Environmental Education Research, 21(4), 525-541.
[16] Wang, H. Y., Duh, H. B. L., Li, N., Lin, T. J., & Tsai, C. C. (2014. (n.d.). An investigation of university students' collaborative inquiry learning behaviors in an Augmented Reality simulation and a traditional simulation. Journal of Science Education and Technology, 23(5), 682-691.
[17] Han, J., Jo, M., Hyun, E., & So, H. J. (2015. (n.d.). Examining young children's perception toward Augmented Reality-infused dramatic play. Educational Technology Research and Development, 63(3), 455-474.
[18] McMahon, D., Cihak, D. F., & Wright, R. (2015. (n.d.). Augmented Reality as a navigation tool to employment opportunities for postsecondary education students with intellectual disabilities and autism. Journal of Research on Technology in Education, 47(3), 157-172.
[19] Sahaat, Z., & Nasri, N. M. (2020). Cabaran Pelaksanaan Mata Pelajaran Reka Bentuk dan Teknologi Sekolah Menengah. *Malaysian Journal of Education (0126-6020), 45*.
[20] Hadi, N. A., Hamzah, M., & Othman, N. (2020). Pengesahan Instrumen Kesediaan Guru dan Kesediaan Teknologi Terhadap Penggunaan Telefon Pintar Dalam Kalangan Guru Reka Bentuk Teknologi Sekolah Menengah: Analisis Faktor Penerokaan (EFA). *Journal of ICT in Education*, *7*(2), 27-38
[21] Abd Kadir, R. B., Aziz, M. A. B. A., Hassan, M. K. B., Rahman, N. B. A., & Sidek, M. A. B. (2020). Tahap Pengetahuan Dan Tahap Kesediaan Guru

Pelatih Institut Pendidikan Guru Kampus Pendidikan Teknik (Ipgkpt) Terhadap Revolusi Industri 4.0 (Ir 4.0). *Jurnal Penyelidikan Teknokrat Ii*, (Jilid Xxi).

[22] Nurtanto, M., Kholifah, N., Masek, A., Sudira, P., & Samsudin, A. (2021). Crucial Problems in Arranged the Lesson Plan of Vocational Teacher. *International Journal of Evaluation and Research in Education*, *10*(1), 345-354.

[23] Husna, S. A., Ritonga, M., Lahmi, A., Saputra, R., & Ayu, S. (2020). The Teachers Unpreparedness in Carrying Out Islamic Education Learning using the Revised 2013 Curriculum in Elementary School. *European Journal of Molecular & Clinical Medicine*, *7*(2), 1520-1528.

[24] Padzil, M. R. (2020). Pak 21: Pembelajaran Berasaskan Projek Dalam Mata Pelajaran Reka Bentuk Dan Teknologi (Rbt). *Jurnal Refleksi Kepemimpinan*, (Jilid Iii).

[25] Sapa'e, N. (2009). Amalan Penggunaan Alat Bantuan Mengajar (ABM) Oleh Bakal Guru-Guru Kemahiran Hidup Dalam Pengajaran Dan Pembelajaran. Universiti Pendidikan Sultan Idris: Tesis Sarjana Muda.

[26] Kiong, T. T., Roslen, K. E., Putra, A. B. N. R., Heong, Y. M., Mohamad, M. M., & Azid, N. (2021). Pembangunan Modul Pengajaran Berasaskan Permainan Digital Bagi Kursus Teknologi Elektrik 1: Development of Module for Digital Game-Based Learning for Electrical Technology 1 Course. *Sains Insani*, *6*(1), 139-143.

[27] Jailani Md Yunos, S. Y. (2008). Peranan Multimedia Dan Guru Dalam Pengajaran Sains, Matematik Dan Teknikal Dalam Bahasa Inggeris. 13-15 December 2008, Universiti Tun Hussein Onn Malaysia (UTHM).

[28] Gusmida, R., & Islami, N. (2017). The development of learning media for the kinetic theory of gases using the ADDIE model with augmented reality. *Journal of Educational Sciences*, *1*(1), 1-10.

[29] Zulfabli, H. M., Ismalina, H. N., Amarul, T., & Ahmad, S. (2019, July). Product development of mechanical practice: Augmented reality (AR) approach. In *AIP Conference Proceedings* (Vol. 2129, No. 1, p. 020055). AIP Publishing LLC.

[30] Maimun Aqsha Lubis, A. A. (2011). The Use of ICT in Teaching Islamic Subjects in Brunei Darulssalam. International Journal of Education and Information Technologies. 1(5): 79-86.

[31] Vaughan, T. (2014). Multimedia : Making it work. 9th Ed.New York : The McGraw-Hill Companies, Inc.

[32] Noor, Z. M. (2011). Persepsi guru tentang penggunaan aplikasi multimedia dalam pengajaran komponen sastera bahasa Melayu. GEMA OnlineTM Journal of Language Studies 11(3): 163-177.

[33] Ghana, S., Singh, S., Jalali, A., Badani, V., & Shankar, S. P. (2020). Adaptive Visual Learning Using Augmented Reality and Machine Learning

Techniques. *Journal of Computational and Theoretical Nanoscience*, *17*(11), 4952-4956.

[34] Karanth, S. (2021). Augmented Reality in Visual Learning. In *ICT Analysis and Applications* (pp. 223-233). Springer, Singapore

[35] Iatsyshyn, A. V., Kovach, V. O., Lyubchak, V. O., Zuban, Y. O., Piven, A. G., Sokolyuk, O. M., ... & Shyshkina, M. P. (2020). Application of augmented reality technologies for education projects preparation.

[36] Norabeerah, S. H. (2011). T*echnical skills in developing Augmented Reality application: Teachers' readiness, Visual informatics*: Sustaining research and innovations. In B. Z. Halimah, P. Robinson, M. Petrou, P. Olivier, T. Shih, S. Velastin & I. Nyström (Eds.), 7067: 360-370. Heid.

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