

DESIGNING PERSUASIVE TECHNOLOGY TO PERSONALISE LEARNING ACTIVITIES IN FuPla PORTAL

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ABSTRACT

Nowadays, learning portals are becoming one of the popular learning tools in this era of pandemic. The existing of this tool becomes an essential necessity in the growth of Online Distance Learning (ODL). Challenges during ODL are students' engagement in the learning process. Interactive multimedia (CSC253) course involved theoretical terms which can drives students to lose their interest and focus in learning. The content consists of fundamental concept which require students to have high memorizing skills. Online teaching and learning tools are used to help students learning and engaging on online learning. Persuasive technology is used as crucial component for long terms engagement. This study has investigated the concept of persuasive and potential elements to be implemented for ODL and further developed the FuPla portal to incorporate elements of think, cooperate, involve and learn independently in a fun way. This portal is developed based on the gaming concept incorporating persuasive technology.

Keywords: *online distance learning, persuasive technology, portal, gaming*

Introduction

Teaching and learning is a process of disseminating and acquiring knowledge that takes place in every nation in the globe. This process evolves throughout ages as the community's influence by government, technologies, and modernization grow. Over time, technology has evolved into a critical component of the educational system and a fundamental instrument for improving education.

Due of pandemic concerns, online teaching and learning has been a viable alternative to face-to-face teaching for a few years. The pandemic challenges force institutions to shift away from traditional face-to-face study and toward online distant learning (ODL). Open distance learning (ODL) is defined as a flexible learning method aimed at teaching students virtually through Internet technology. The learning paradigm itself shifts from a heavy reliance on lecturers to nearly self-learning and isolation in the student's hometown. As a result, future education is increasingly reliant on online technology, which is now popular among today's youth.

Several studies have been conducted to identify the potential, performance and challenge of ODL among students. Libasin et al. (2021) have studied the performance of online learning specifically

on Calculus subject. The study split the performance that happen either via synchronized and asynchronous approach. The result showed that the assessment significantly higher among undergraduate students that study via synchronized, compared to asynchronous method. Further, Othman et al. (2022) has investigated the performance pre-university students on basic mathematics subject that happen fully via online learning. The students split into 2 groups: 1) study via assistant of mathematical teaching model via online learning. And 2) study without teaching model via online learning. The result showed that significant improvement in students' assessments within the group with mathematics teaching model compared to students that learn without model. Both of these study shows that the engagement between instructor and students in anyway have the significant impact in motivating students to follow the lesson thoroughly.

In addition, several studies that incorporating various tools in teaching online in order to increase the two-way communication among instructor and students has improved students' attraction and motivation when learning online. Yusoff et al. (2020) has investigated the student's interaction when teaching and learning via google online and KAMI application as interactive and easy to be implemented for online education. Further, the similar research was done again by Yusoff et a. (2021) that have investigated the impact of WhatsApp as an interactive instructional tool for ODL. The study showed very good feedback from students and even better compared to face-to-face in terms of student's ability to engage in lesson, enjoy the interactive communication and did not shy to ask questions and give responses. Another study by Rahman and Ghani (2021) has investigated and discover the effectiveness of notability and the use of ipad as a tool for teaching and learning Calculus on online class. The results positively showed the increment of active learning due to creativity of instructor in implementing different tools in online teaching.

As a result, there are numerous advantages and potential aspects of ODL for modern teaching and learning. Decentralization of the teaching process and individualised learning, flexible access at any time or place, promotion of active learning student motivation and satisfaction, cost-effectiveness and reduced instruction time, consistent delivery of instructional content, cost reduction and reuse of instructional material, and increased access to information are all advantages of educational strategies based on the web or e-learning tools (Alvarez et al., 2017). Despite all of its advantages, the ODL is still in its infancy to declare success. Garcia-moales et al. (2021) has described the barriers of ODL from perspective of three agents: students, professors and institutions. The main hurdle comes from students who have technological issues, such as internet connection accessibility and cost. Universities have given this issue their undivided attention, such as allowing low-income students to reside in hostels that provide both accommodation and internet access. Following that are physiological and attitude concerns

such as difficulty maintaining focus in a purely online situation, boredom, isolation, and a lack of self-organizing capabilities. These concerns have been ongoing and highly subjective, as they differ amongst students, courses, and instructors or professors.

This study will discuss on persuasive technology that will enable to monitor students in terms of attitudes, behaviour and belief throughout the online learning process. The rest of this article will discuss the concept of persuasive technology and development of FuPla portal based on the Persuasive technology.

Concept of Persuasive Learning for on Online learning

A growing variety of information technology systems and services are being developed in order to influence user attitudes, behaviour, or both. Persuasive Technology (PT) refers to technologies that are designed to change users' behaviour, attitudes, and beliefs about an issue without resorting to intimidation or deception. Persuasive Technology intervention has been found to be successful in motivating people to attain a certain goal in a variety of domains, including health, physical activity, and even education (Alok, 2020; Orji, 2018;Widyasari, 2019).

According to Behringer et al (2013), persuasive technology is tool developed from several principles of persuasive design (PD) that covers different aspect of persuasion and become crucial when implementing for e-Learning. Figure 1 shows persuasive technology at the intersection of interactive computer technology and persuasion.

The propose of persuasive design strategies consist of elements which are; 1)Reduction that allow to skips certain process tailor to user prescribe; 2)Tunnelling that has predetermine direction helps user to narrow down to right steps of choice; 3)Suggestion based on user favour or interest; 4)Self-monitoring allow user to check for progress, surveillance helps user to not only check progress but double cross information with another similar user to inspired actions; and 5) Kairos for opportune moment to perform persuasive action.

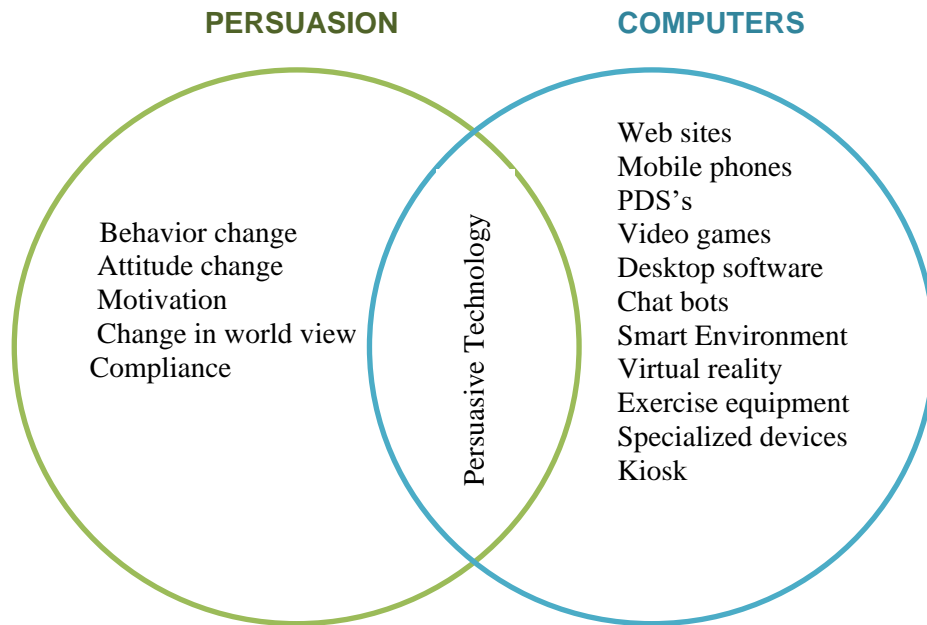


Figure 1: Persuasive technology as intersection of persuasive concept and computers applications (Fogg,2003; Behringer et al.,2013)

Oinas-Kukkonen et al. (2009) has proposed persuasive system design that consist 28 design principles for designing and evaluating intended system. As illustrated in Figure 2, the suggested framework is divided into several phases. The key issues, the process model, and the design principles to be employed for the development and evaluation of persuasive systems are all specified in this model. The primary focus is on primary task, dialogue, system credibility, and social support, which are all categories in designing of persuasive system principles.

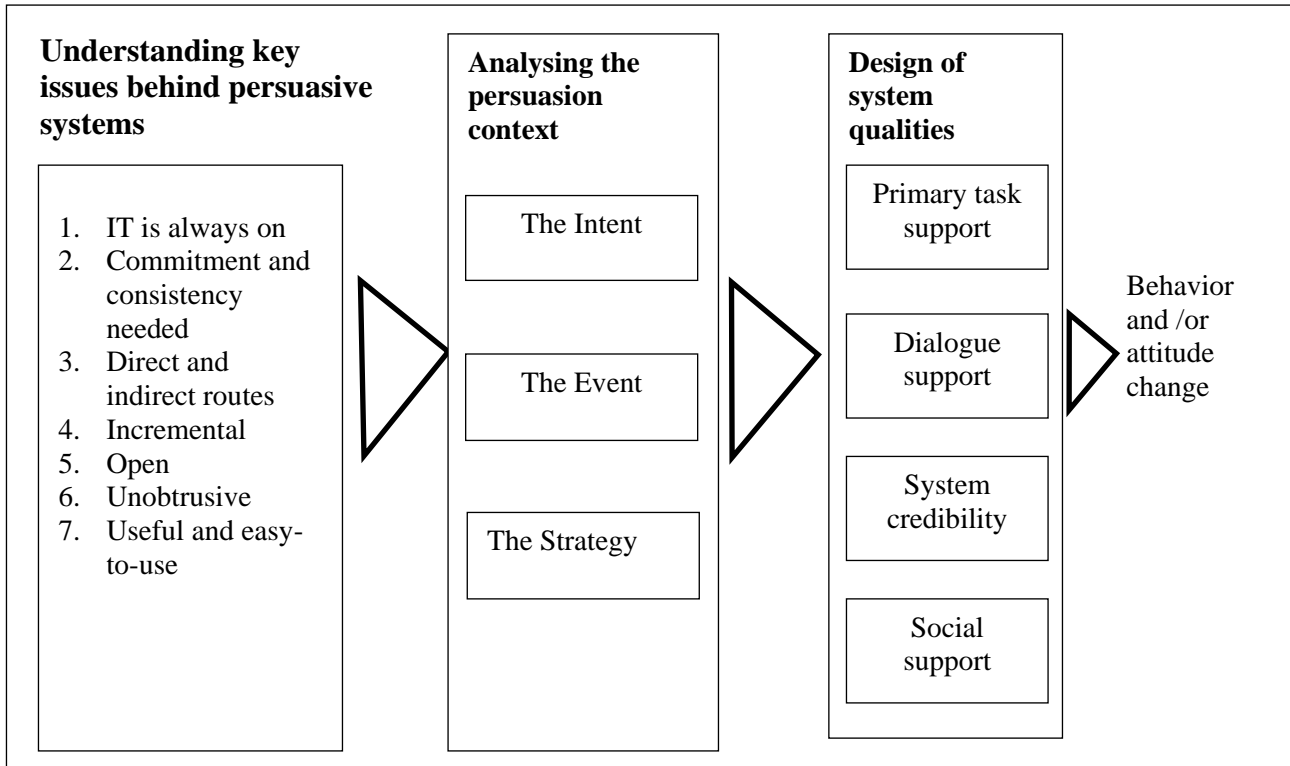


Figure 2: Phases in Persuasive System Development (Oinas-Kukkonen et al. ,2009)

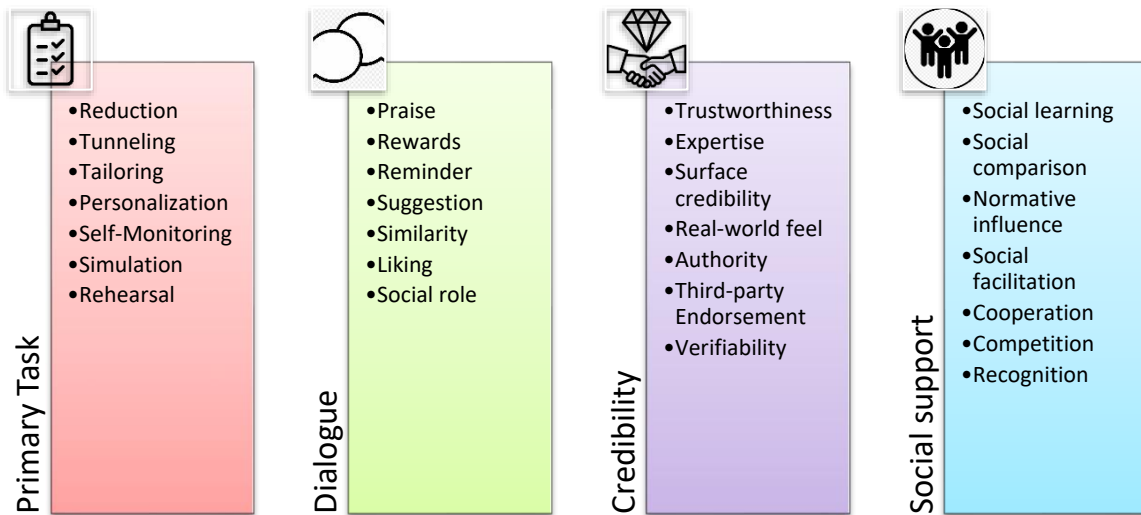


Figure 3: Description of Persuasive Design principles (Oinas-Kukkonen et al. ,2009)

Methodology

The goal of this research is to create a portal that will help students learn important concepts in each chapter that demand long-term memorization. The portal is based on persuasive technology, which will connect online learning with a persuasion approach, assisting students in changing their attitudes and behaviours toward self-learning online for the Interactive Multimedia course among Hotel Management students. As a result, in constructing this online learning portal, this study closely maps the notion of persuasive technology proposed by Behringer et al (2013) and Oinas-Kukkonen et al. (2009). Table 1 depicts the mapping strategies of persuasive technologies in order to develop the learning portal.

Table 1: The design principle implemented from Oinas-Kukkonen et al. (2009) into FuPla portal

Strategy	Example Requirement	Our Implementation
Primary Task Support		
Personalization	The system should offer personalized content and services for its user	The contents are organised into topics allow user to choose based on their preference knowledge
Simulation	System should provide means for observing the link between the cause and effect with regard to user behaviour.	User able to compare the result of performance for specific exercises with colleagues
Self-Monitoring	System should provide means for users to track their performance or status.	Each exercise allow user to re-sit the exercise to improve the performance.
Dialogue Support		
Rewards	System should provide virtual rewards for users in order to give credit for performing the target behaviour.	Tokens of appreciation will be given for each finished exercise as complement for extra effort in studies.
Credibility Support		
Real-world feel	System should provide information of the organization and/or actual people behind its content and services.	The instructor assigned to the portal are the one will teach the lesson online.

Social Support		
Social Comparison	System should provide means for comparing performance with the performance of other users.	Comparison of knowledge enable the comparison via Kahoot gaming questions.
Social Learning	System should provide means to observe other users who are performing their target behaviors and to see the outcomes of their behavior	Combination of personalised and collaborative gaming allow them to evaluate themselves.
Cooperation	System should provide means for co-operation.	Cooperation stands on collaborative learning.
Normative influence	System should provide means for gathering together people who have the same goal and make them feel norms.	Collaborative games via Kahoot allow them to communicate and learn with each other
Competition	System should provide means for competing with other users.	Students compete among colleagues on same questions and compete for highest marks

Result and Discussion

The development of learning portal is named as FuPla which is known for fun and play portal based on interactive gaming for learning theoretical concept across 10 topics in Interactive Multimedia course. Based on the proposed methodology of persuasive technology, the outcome of the portal will be discussed in this section. In this study, cooperation, fun and rewards are key elements of persuasion in designing the persuasive technology. Hence, the portal has been divided into 2 sections of gaming which are: 1) Kahoot that promote competition, social comparison, real-world feel and simulation. This active n fun activities usually end up with them laughing with each other online because of the given answer and questions. Figure 4 shows the Kahoot competition questions for 10 different topics. Each topic consists of several questions regarding the important concept that they must know in order to master each topic. And 2) Wordwall that promote self-monitoring, personalization, rewards and social learning as elements of persuasive design. In this design several gaming methods have been cooperated in order to polish their standard of learning the fundamental concept and idea in each topic. The maze chase, match up, world search, game show quiz, true and false, missing word and anagram are collections of multiway gaming from worldwall tool has been implemented to support the persuasion design proposed in this portal. Figure 5 shows example of implementation using maze chase that have being applied for leaning concept of topics1.



Figure 4: Kahoot tool in implementing important concept for 10 topics in FuPLa learning portal

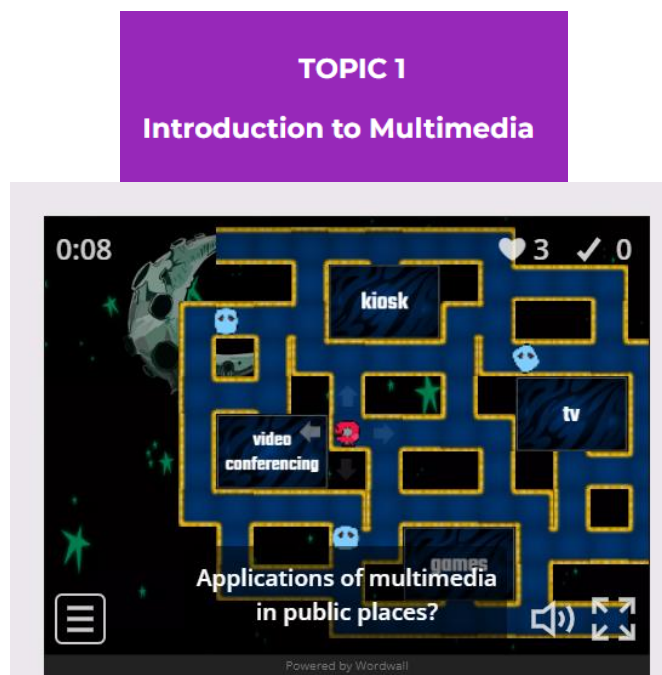


Figure 5: Implementation of Maze Chase game for topic1

Further, 10 set of personalised gaming learning tools has been developed based on the multiway gaming provided by Worldwall tool. These game has been implemented into 10 different topics that consist of collection of fundamental questions. The implementation illustrates in Figure 6. Students that has completed all the topics will send their progress to the instructor personally to consult and gain the rewards.

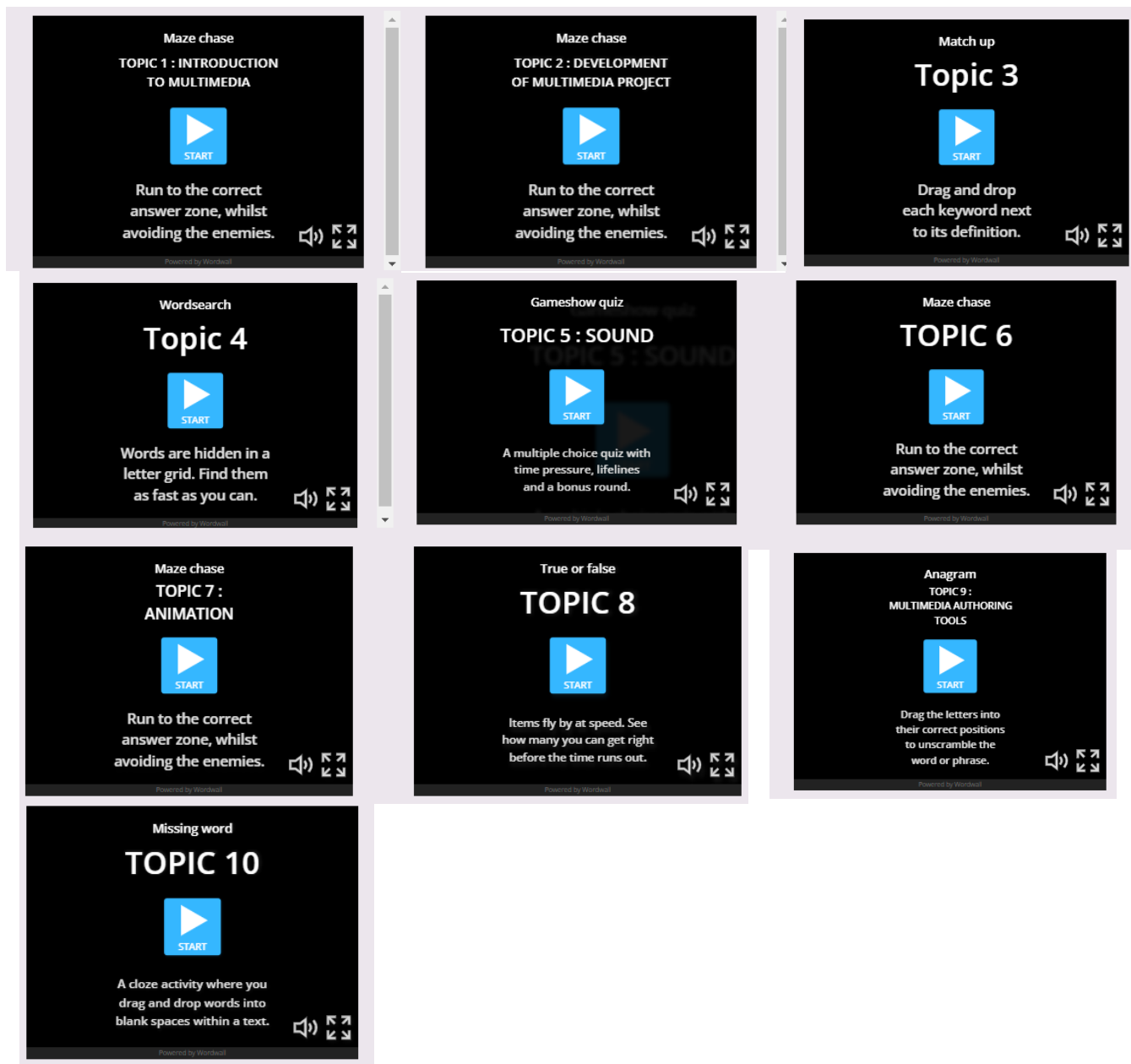


Figure 6: Implementation of various gaming elements applied for personalize persuasion design.

Conclusion

Implementing persuasive technology into ODL is difficult owing of the variability of students' emotional levels, which changes throughout courses, age, and maturity. The development of FuPal is one of steppingstone for incorporating persuasive technology as one of crucial elements in ODL tools of teaching and learning. In future, students' performance, feedback and more improvement will be reported in this portal.

References:

- Abdul Rahman, M. S., & Abdul Ghani, M. T. (2021). The Use of iPad For Calculus Class in Higher Education: Notability Application. *International Journal of Academic Research in Progressive Education and Development*, 10(2), 675–686. <https://doi.org/10.6007/ijarped/v10-i2/10023>
- Alok, G., Saipriya, P., & Prabhanjan, N. (2020). Persuasive learning strategies for transforming engineering education. *Journal of Engineering Education Transformations*, 33(Special Issue), 402–407.
- Alvarez, A. G., Dal Sasso, G. T. M., & Iyengar, M. S. (2017). Persuasive technology in teaching acute pain assessment in nursing: Results in learning based on pre and post-testing. *Nurse Education Today*, 50, 109–114. <https://doi.org/10.1016/j.nedt.2016.12.019>
- Behringer, R., Gram-Hansen, S.B., Soosay, M., Mikulecká, J., Smith, C., Winther-Nielsen, N., & Herber, E. (2013). Persuasive Technology for Learning in Business Context. *International Journal of Information Systems and Engineering*, 1(1), 86–97. <https://doi.org/10.24924/ijise/2013.04/v1.iss1/86.97>
- García-morales, V. J., Garrido-moreno, A., & Martín-rojas, R. (2021). *The Transformation of Higher Education After the COVID Disruption : Emerging Challenges in an Online Learning Scenario*. 12(February), 1–6. <https://doi.org/10.3389/fpsyg.2021.616059>
- Libasin, Z., Azudin, A. R., Idris, N. A., Abdul Rahman, M. S., & Umar, N. (2021). Comparison of Students' Academic Performance in Mathematics Course with Synchronous and Asynchronous Online Learning Environments during COVID-19 Crisis. *International Journal of Academic Research in Progressive Education and Development*, 10(2), 492–501. <https://doi.org/10.6007/ijarped/v10-i2/10131>
- Mohamed Yusoff, S. A., Kadar, R., Wan Mohamad, W. A., Mydin, A., & Abdullah, M. H. (2021). The Impact of WhatsApp as an Instructional Tool for Online Distance Teaching and Learning (ODL). *International Journal of Academic Research in Progressive Education and Development*, 10(2), 585–595.
- Mohamed Yusoff, S. A., & Kadar, R. (2020). Implementing Google Online and KAMI Applications to Supervise Online Distance Teaching and Learning (ODL). *E-Book of Special Interest Group (SIG) e-Learning@Computer Science (CS)*, 1(September), 76–81.
- Musa, N., Shaffie, Z. A., & Mokhsin, M. (2010). A review of persuasive techniques in developing children educational system. *CSSR 2010 - 2010 International Conference on Science and Social Research, C SSR*, 1110–1113. <https://doi.org/10.1109/CSSR.2010.5773698>
- Oduor, M., Alahäivälä, T., & Oinas-Kukkonen, H. (2014). Persuasive software design patterns for social influence. *Personal and Ubiquitous Computing*, 18(7), 1689–1704. <https://doi.org/10.1007/s00779-014-0778-z>
- Oinas-Kukkonen, H., & Harjumaa, M. (2009). Persuasive systems design: Key issues, process model, and system features. *Communications of the Association for Information Systems*, 24(1), 485–500. <https://doi.org/10.17705/1cais.02428>

- Orji, F. A., Vassileva, J., & Greer, J. (2018). Personalized persuasion for promoting students' engagement and learning. *CEUR Workshop Proceedings, 2089*, 77–87.
- Othman, J., Ahmad, N., Umar, N., Kadar, R., Mohamed Yusoff, S. A., Abdul Wahab, N., & Nordin, M. N. (2022). *Mathematics Performance Among Pre-Diploma Students with Online Learning Approach During Movement Control Order (MCO)*. 37(3), 110–122.
- Widyasari, Y. D. L., Nugroho, L. E., & Permanasari, A. E. (2019). Persuasive technology for enhanced learning behavior in higher education. *International Journal of Educational Technology in Higher Education, 16*(1). <https://doi.org/10.1186/s41239-019-0142-5>
- Wood, W. (2000). Attitude change: persuasion and social influence. *Annual Review of Psychology, 51*(May), 539–570. <https://doi.org/10.1146/annurev.psych.51.1.539>