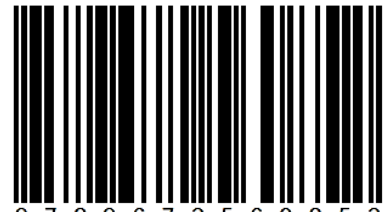


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Unit Penerbitan

Jabatan Sains Komputer & Matematik (JSKM)
Universiti Teknologi MARA Cawangan Pulau Pinang

SCIENCE & DIGITAL TECHNOLOGY IN e-LEARNING FUTURE TRENDS

SCIENCE & DIGITAL TECHNOLOGY IN e-LEARNING FUTURE TRENDS

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PREFACE

The committee of SIG CS@e-Learning would like to express our sincere gratitude to Allah S.W.T for the fourth articles publication shared by lecturers from the Department of Computer & Mathematical Sciences, UiTM Penang Branch. Total of 10 articles have been submitted and all papers were accepted for publication. The articles submitted, have shown that the quality of contents and research framework discussed are potentially to be published in those journals indexed by SCOPUS, WOS or ERA. Although, the articles submitted within 6 to 8 pages, the authors are able to explain academically and professionally.

The theme of fourth volume focusing on innovation of science and digital technology in e-Learning future trends. The integration of e-learning innovations is the current challenges for organisations in Higher Education in order to support learning, teaching, and administrative processes. The popularity of online courses has increased over the past decade, and the global online learning market is expected to reach \$325 billion by 2025. New trends in e-learning will be covered under artificial intelligence (AI), micro credentials, big data, virtual and empowered reality, blended learning, cloud e-learning, gamification, mobile learning, Internet of things, and online video.

The committee encouraged the authors to extend the contents of paper submitted by adding elements of research value. The techniques and methods to conduct research and elaboration of the projects are the main things that need to be enforced in article constructions. The reviewers are keen to see new techniques or outstanding method of analysis which portray strong research findings. Not the common techniques which already used by the practitioners. Finally, we were very appreciated with the supports given by all authors and continue write papers. Thank you.

Ts. Jamal Othman

Chief Editor

SIG CS@e-LEARNING

SCIENCE & DIGITAL TECHNOLOGY IN e-LEARNING FUTURE TRENDS

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TATACARA MUDAH MENGANALISA UJIAN HIPOTESIS MENGUNAKAN MICROSOFT EXCEL

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ABSTRAK

Microsoft Excel merupakan salah satu medium yang sering digunakan untuk menganalisis data dengan mudah. Salah satu kegunaannya ialah dapat membentuk formula dan dijadikan garis panduan dalam menyelesaikan masalah berkaitan statistik. Statistik sering digunakan untuk menganalisis dan memahami prestasi dan trend dalam pelbagai pekerjaan. Pelajar dalam kursus kejuruteraan juga mengambil statistik sebagai salah satu mata pelajaran yang diperlukan. Oleh itu, alat bantu belajar diwujudkan menggunakan perisian Microsoft Excel untuk membantu pelajar memahami topik statistik, terutamanya ujian hipotesis. Ia merupakan salah satu usaha pendidik untuk membantu pelajar memahami konsep statistik. Ia mudah digunakan dan mudah diperolehi. Dapatan kajian berkaitan keberkesanannya menunjukkan alat ini dapat menjimatkan masa pelajar untuk memilih ujian hipotesis yang betul. Secara tidak langsung dapat mengurangkan kesilapan dalam menyelesaikan topik ujian hipotesis. Usaha ini diharapkan dapat membimbing pelajar dalam ujian hipotesis dengan cara yang tepat dan teratur.

Keywords: Statistik, ujian statistik, ujian hipotesis, Microsoft Excel

Pengenalan

Statistik merupakan salah satu bidang matematik yang berkaitan dengan pengumpulan data, menganalisis, mentafsir, dan membuat kesimpulan daripada data. Statistik adalah penting di dalam kehidupan seharian dan juga di peringkat institusi pendidikan. Kebanyakan program ijazah yang ditawarkan, statistik merupakan salah satu kursus yang wajib di ambil. Walau bagaimanapun, terdapat beberapa orang pelajar yang masih lemah dan tidak dapat menguasai beberapa topik untuk subjek tersebut. Kajian yang telah dijalankan oleh Shamsuddin et al. (2021) mendapati bahawa majoriti pelajar tidak dapat memahami soalan yang berkaitan dengan topik ujian hipotesis iaitu topik yang banyak digunakan dalam analisa data. Dapatan kajian yang dikenalpasti adalah, pelajar sering membuat kesilapan dalam membaca, menyelesaikan masalah, memahami masalah, transformasi, kemahiran proses, dan menulis jawapan akhir.

Kekerapan pelajar melakukan kesalahan statistik juga telah ditemui dalam beberapa kajian lain. Hanapiah dan Luvy (2020) mengenal pasti bahawa keupayaan matematik pelajar untuk menyelesaikan soalan statistik adalah rendah, dan terdapat ramai pelajar membuat kesilapan semasa menjawab soalan. Pandangan ini disokong oleh Raras (2018) yang menulis bahawa hampir semua pelajar melakukan kesilapan semasa menyelesaikan masalah statistik. Pelajar tidak menulis langkah pengiraan yang

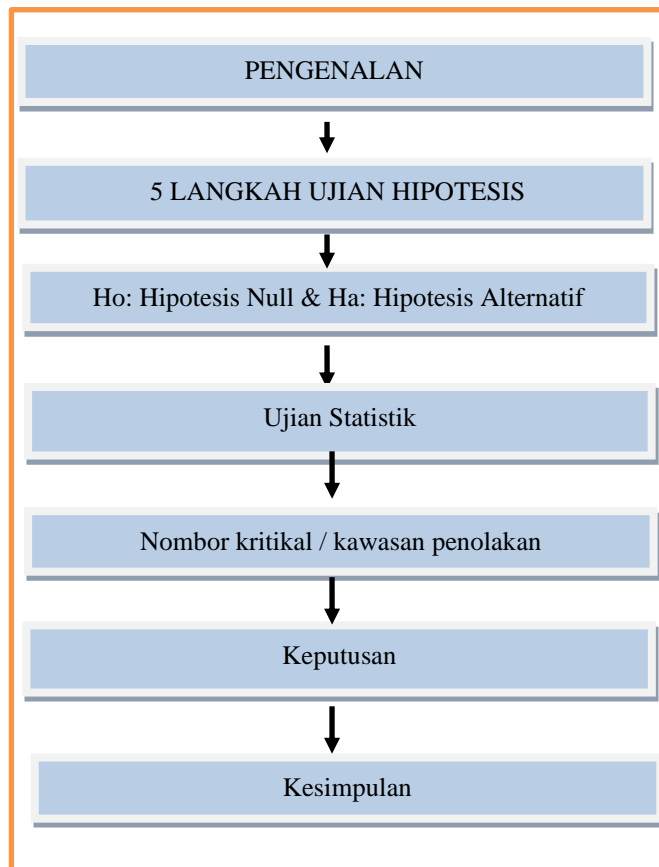
terperinci, dan mereka tidak dapat mencari penyelesaian muktamad kepada masalah tersebut. Berdasarkan hasil kajian yang diperolehi, para pendidik perlu membangunkan satu inovasi pengajaran dan pembelajaran statistik bagi memudahkan pelajar untuk memahami subjek statistik dengan lebih berkesan terutamanya dalam topik hipotesis.

Beberapa contoh aplikasi web interaktif telah dibina untuk menarik minat pelajar mempelajari statistik. Antaranya ialah Aberson (2021) yang telah menyediakan garis panduan cara menggunakan pakej R untuk pelajar. Pakej ini membolehkan pengajar mencipta tutorial interaktif yang mudah dengan menggunakan video, kuiz dan latihan untuk menggalakkan penglibatan pelajar dalam pembelajaran statistik. Hardin dan Johanna (2018) pula mencipta data dinamik dalam bilik darjah statistik. Manakala Xiaofei, Cynhia dan Jon (2017) menyerlahkan visualisasi data. Alat pengajaran yang inovatif ini telah banyak membantu pelajar dalam pembelajaran statistik. Justeru itu, penyelidik telah membangunkan satu alat bantu belajar menggunakan perisian Microsoft Excel untuk membimbing pelajar dalam menyelesaikan topik ujian hipotesis. Kajian terhadap penggunaannya oleh pelajar juga telah dikaji bagi melihat keberkesanannya.

Metodologi

Produk yang dihasilkan adalah merupakan alat bantu belajar yang dapat menghasilkan cara yang lebih mudah untuk mempelajari dan memahami ujian hipotesis dalam statistik. Ianya direka dan dicipta menggunakan perisian Microsoft Excel iaitu produk yang mesra pengguna.

Rajah 1 menunjukkan langkah-langkah bagaimana ujian hipotesis perlu dijalankan. Pelajar perlu memilih terlebih dahulu saiz sampel, varians, dan jenis hipotesis pada lembaran yang pertama untuk mengenal pasti ujian statistik yang betul digunakan (Rajah 2). Kemudian dalam lembaran kerja seterusnya, mereka boleh melihat garis panduan yang dipaparkan untuk ujian statistik yang dipilih. Pelajar juga boleh membuat perbandingan antara ujian statistik dan memahami dengan lebih baik apabila menggunakan alat ini.



Rajah 1: Langkah-langkah ujian hipotesis

TATACARA DALAM UJIAN HIPOTESIS

SAMPLE	One sample	IF 3 OR MORE SAMPLES
VARIANCE POPULATION	Unknown (equal)	
SIZE SAMPLE	Less than 30	
ALTERNATIVE HYPOTHESIS (H1)(claim)	More than	
STATISTICAL TEST:	T-TEST (more than)	

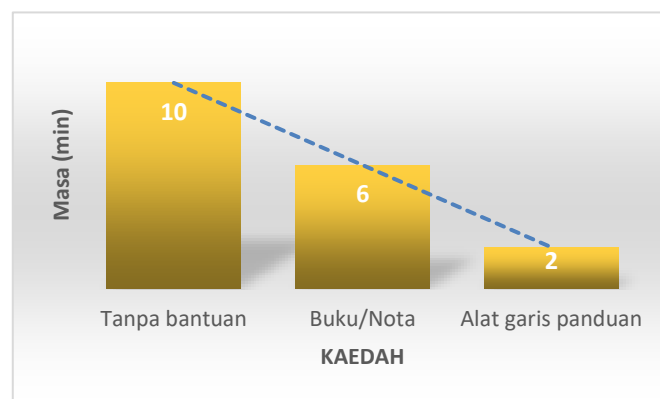
Rajah 2: Lembaran pertama

Seterusnya, alat bantu belajar ini diaplikasikan oleh pelajar bagi melihat keberkesanannya. Seramai 100 orang pelajar yang sedang mengikuti kursus statistik telah dipilih. Pelajar diberikan satu set soalan statistik untuk mereka mengenal pasti ujian statistik yang sesuai. Mereka diasingkan secara rawak kepada tiga kumpulan. Kumpulan pertama menjawab soalan secara tanpa bantuan iaitu tanpa melihat buku atau nota. Kumpulan kedua dibenarkan untuk membuka buku atau nota dan kumpulan

ketiga menggunakan Microsoft Excel iaitu alat bantu belajar yang dihasilkan. Peruntukan masa yang mereka gunakan untuk menyelesaikan soalan direkodkan bagi setiap kumpulan.

Dapatan kajian

Purata masa untuk ketiga-tiga kumpulan pelajar menyelesaikan soalan telah dipaparkan dalam Rajah 3. Ia menunjukkan bahawa purata masa yang diperuntukkan oleh pelajar yang menggunakan garis panduan adalah selama 2 minit berbanding kumpulan lain. Terdapat sekurang-kurangnya sebanyak 80% penjimatan masa untuk pelajar memilih ujian statistik yang betul dengan menggunakan alat garis panduan ini.



Rajah 3: Graf masa yang diperlukan bagi setiap kaedah yang digunakan

Perbincangan dan kesimpulan

Alat bantu belajar statistik ini adalah produk yang mesra pengguna dan boleh membantu pelajar menentukan ujian hipotesis yang sesuai. Ia juga boleh diaplikasikan di dalam penyelidikan. Selain itu, pelajar boleh menggunakannya untuk mengulang kaji pelajaran dengan lebih mudah. Dengan adanya alat bantu belajar ini, diharap dapat membantu mengurangkan kesalahan pelajar dalam menentukan ujian hipotesis. Ini kerana pemilihan hipotesis yang salah boleh membawa kepada tafsiran yang salah dan kesimpulan yang tidak sesuai. Selain itu, ia juga dapat menjimatkan masa dan keputusan yang diperoleh juga lebih tepat kerana pemilihan ujian statistik yang betul. Walaupun ia hanya membantu pelajar dalam memilih ujian yang betul, pelajar secara tidak langsung mungkin mendapat pemahaman yang lebih baik tentang pendekatan sebenar jika mereka menggunakannya untuk menyelesaikan masalah yang disediakan sebagai latihan secara berkala. Bagi pengkaji pula, alat ini diharapkan dapat membantu untuk mendapatkan keputusan yang baik apabila melaksanakan kajian menggunakan ujian hipotesis.

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ANALISA KESALAHAN PELAJAR BAGI SUBJEK STATISTIK: TABURAN NORMAL

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ABSTRAK

Kompetensi pelajar dalam penyelesaian masalah yang melibatkan topik statistik perlu dipertingkatkan supaya kemahiran dan pengetahuan dapat didalami dan dipelajari dengan lebih efektif. Pelajar kerap mengulangi kesilapan dalam penyelesaian yang melibatkan pelbagai topik dalam subjek statistik di mana salah satunya adalah topik bagi taburan normal. Justeru, kajian ini dijalankan untuk menentukan secara spesifik kesalahan yang kerap dilakukan oleh pelajar dalam penyelesaian jalan kerja bagi topik taburan normal. Sebanyak 45 skrip jawapan pelajar dianalisa untuk dijadikan sampel kajian. Kajian ini mendapati bahawa masih terdapat pelajar yang melakukan kesalahan jalan kerja dalam penggunaan Jadual Z iaitu Sifir Taburan Normal Piawai. Pelajar yang melakukan kesalahan ini didapati kurang mahir dalam konsep luas rantau bagi mendapatkan nilai kebarangkalian berdasarkan skor Z. Pelajar juga melakukan kesalahan yang sama bagi mendapatkan jawapan untuk skor Z apabila kebarangkalian bagi sesuatu soalan diberi. Secara keseluruhannya, pensyarah perlu menitikberatkan konsep luas rantau dan juga skor Z yang melibatkan kedua-dua tanda positif dan negatif semasa pengajaran dan pembelajaran bagi topik Taburan Normal. Malah, pensyarah juga perlu menekankan notasi dan istilah asas terutamanya perbezaan parameter seperti sisihan piawai dan varians bagi mengelakkan kekeliruan dan kesilapan dalam langkah kerja.

Kata Kunci: taburan normal, Jadual Z, Sifir Taburan Normal Piawai, skor Z, luas rantau

Pengenalan

Statistik merupakan suatu proses pengumpulan, organisasi, analisa dan tafsiran sesuatu data yang diperolehi. Data juga diolah dan dipersembahkan dalam beberapa bentuk seperti jadual, grafik dan diagram. Bidang statistik ini terbahagi kepada dua jenis iaitu huraian dan inferensi. Statistik huraian merupakan proses yang dimulakan dengan pengumpulan data sehinggalah ke persembahan data dalam bentuk yang lebih mudah difahami. Manakala statistik inferensi adalah apabila data dianalisa seterusnya kesimpulan dibuat berdasarkan dapatan analisa yang diperolehi.

Terdapat pelbagai topik yang boleh dipelajari dalam subjek statistik. Bagi peringkat awal, salah satu topik yang akan diperkenalkan ialah taburan kebarangkalian seperti Binomial, Poisson, Normal dan pelbagai lagi. Berdasarkan kajian Maisurah et al. (2021), masih ada pelajar yang membuat kesilapan dalam topik kebarangkalian. Topik kebarangkalian ini merangkumi topik bagi taburan normal. Walaupun peratus kesilapan dalam topik kebarangkalian ini tidak terlalu tinggi, namun kesalahan ini perlu diteliti agar kesilapan yang sama tidak berulang.

Kurnia et al. (2019) juga mengkaji kesalahan dalam topik statistik, namun kajian ini hanyalah tertumpu kepada topik yang berkaitan ujian hipotesis. Didapati terdapat pelbagai kesalahan yang dilakukan oleh para pelajar bermula dari pentafsiran pembacaan soalan sehinggalah kepada kesalahan yang dilakukan dalam jalan kerja bagi mendapatkan jawapan akhir. Terdapat juga kajian lain yang menganalisa kesilapan pelajar dalam melakukan latihan dalam ujian hipotesis, analisis regresi dan korelasi, dan konsep asas kebarangkalian dalam subjek statistik dan kebarangkalian (Syelfia, 2017). Berdasarkan kajian ini, didapati pelajar membuat kesilapan dalam melihat jadual dan kesilapan dalam melakukan latihan berkaitan konsep asas kebarangkalian.

Kesalahan dalam asas statistik perlu diatasi memandangkan masih terdapat segelintir pelajar yang membuat kesilapan sebegini. Pelajar yang membuat kesalahan dalam asas matematik akan menyebabkan pelajar ini menggunakan konsep yang salah dalam menyelesaikan jalan pengiraan (Maisurah et al., 2014). Begitu juga dengan situasinya apabila penguasaan konsep asas statistik yang agak lemah boleh menyebabkan para pelajar membuat kesilapan dalam penyelesaian masalah statistik. Berdasarkan kajian Roza, 2017 kajian mendapati bahawa kesalahan konsep asas statistik mempunyai peratus kesalahan yang paling tinggi jika dibandingkan dengan kesalahan bagi prinsip dan operasi dalam pengiraan statistik. Bagi mengatasi masalah ini, pensyarah dicadangkan untuk meneliti kesalahan yang dilakukan oleh pelajar dan disarankan pelajar untuk membuat latihan yang kerap berkaitan konsep asas statistik dan perlu diiringi dengan bimbingan pensyarah (Roza, 2017).

Kesalahan dalam menjawab soalan statistik perlu di atasi agar kesilapan yang dilakukan boleh diminimumkan. Penggunaan konsep asas dan juga kaedah statistik dengan betul boleh memberi impak yang ketara kepada pencapaian dalam subjek statistik dengan lebih baik. Berdasarkan (Nora, 2007) kajian membentangkan kaedah yang boleh digunakan dan mengenal pasti masalah dengan data statistik dan sekiranya garis panduan ini diikuti, masalah dalam menjawab persoalan dalam statistik boleh diatasi.

Metodologi

Kajian ini melibatkan pelajar Ijazah Sarjana Muda Kejuruteraan Elektrik yang mengambil subjek statistik. Seramai 45 pelajar dijadikan sampel kajian bagi tiga kumpulan yang berbeza. Analisa jawapan penilaian dijalankan untuk mengenalpasti kesilapan yang kerap diulangi oleh para pelajar.

Soalan-soalan yang ditanya dalam penilaian kepada pelajar adalah soalan yang berkaitan dengan penyelesaian masalah bagi taburan normal yang terbahagi kepada 3 soalan. Jadual 1 berikut merupakan pembahagian soalan yang diuji kepada para pelajar.

Jadual 1: Pembahagian Soalan

Soalan	Subtopik
1	Mencari nilai kebarangkalian berdasarkan nilai z yang diberi
2	Mencari nilai z berdasarkan nilai kebarangkalian yang diberi
3	Mencari nilai kebarangkalian berdasarkan nilai z yang diberi (Central Limit Theorem)

Analisa dan Perbincangan

Berdasarkan pemerhatian dalam kesalahan yang dilakukan pelajar mengikut pembahagian soalan seperti dalam Jadual 1, didapati terdapat beberapa kesilapan yang sama oleh pelajar yang berlainan. Jadual 2 berikut menunjukkan beberapa kesilapan yang dilakukan oleh pelajar bagi topik taburan normal.

Jadual 2: Kesalahan dalam Topik Taburan Normal

Kesalahan
1. Pelajar memasukkan nilai sisihan piawai yang salah
2. Kesilapan memasukkan nilai dari Jadual Z
3. Tidak memahami konsep luas rantau

Di antara kesalahan yang kerap dilakukan oleh pelajar ialah kesilapan dalam menentukan nilai sisihan piawai. Ini mungkin disebabkan pelajar agak keliru dengan simbol dan istilah yang digunakan. Terdapat pelajar yang tertukar nilai di antara varians dan sisihan piawai. Pelajar perlu mengetahui bahawa simbol σ adalah notasi bagi sisihan piawai. Manakala simbol σ^2 adalah notasi bagi varians.

Terdapat juga pelajar yang membuat kesilapan dalam memasukkan nilai dari Jadual Z. Kesilapan ini timbul apabila pelajar keliru di antara skor Z dan kebarangkalian. Kekeliruan ini berlaku apabila soalan yang ditanya adalah untuk mengetahui skor Z apabila nilai kebarangkalian diberi dalam soalan. Namun sekiranya soalan yang ditanya adalah untuk mengetahui nilai kebarangkalian apabila skor Z diberi, peratus kesilapan yang dilakukan adalah kurang kerana cara pembacaan nilai dari Jadual Z adalah lebih mudah. Bagi mengelakkan kekeliruan ini, pelajar disarankan untuk melakukan latihan dalam penggunaan Sifir Taburan Normal Piawai.

Dalam topik taburan normal, pemahaman berkaitan konsep luas rantau adalah sangat penting. Kesilapan konsep luas semasa menjawab soalan berkaitan taburan normal akan menyumbang kepada peratus kesilapan yang tinggi.

Berikut merupakan soalan yang ditanya semasa penilaian bagi topik taburan normal. Pembahagian soalan adalah mengikut Jadual 1 di atas.

Corrugated pipes are manually cut into nominal lengths of 100 cm. The significant lengths are normally distributed with a mean of 100 cm and a standard deviation of 9 cm.

- i) *Find the probability that a band selected at random has a length within 2 cm of the mean.*
- ii) *Given bands shorter than k cm are rejected. What is the value of k if 10% are rejected?*
- iii) *Suppose there are 30 samples of the corrugated pipes selected. Find the probability that the sample mean has a length below 106 cm.*

Gambarajah berikut merupakan beberapa kesilapan dalam langkah kerja yang dilakukan oleh pelajar. Kesalahan-kesalahan yang dilakukan ini adalah mengikut Jadual 2 di atas.

$$P(100-2 < X < 100+2) = P\left(\frac{(100-2)-100}{\sqrt{9}} < Z < \frac{(100+2)-100}{\sqrt{9}}\right)$$

$$= P(-0.6667 < Z < 0.6667)$$

$$= P(Z < 0.6667) - P(Z > 0.6667)$$

Jalan kerja yang betul adalah:

$$= P\left(\frac{98-100}{9} < Z < \frac{102-100}{9}\right) = P(98 < X < 102)$$

Pelajar sepatutnya memasukkan nilai 9 namun berlaku kekeliruan kerana pelajar beranggapan nilai 9 tersebut perlu dipuncakuasaduakan.

$\bar{X} \sim N (\mu = 100, \sigma_{\bar{X}}^2 = \frac{9}{30})$

$P(\bar{X} < 106) = P\left(z < \frac{106 - 100}{\sqrt{\frac{9}{30}}}\right)$

$= P(z < 10.9545)$

Jalan kerja yang betul adalah:

$$P\left(z < \frac{106 - 100}{\frac{9}{\sqrt{30}}}\right) = P(z < 3.65)$$

Kesalahan yang sama seperti pada soalan (i) di mana pelajar memasukkan nilai sisihan piawai yang salah.

Gambarajah 1: Nilai sisihan piawai yang salah

b) $P(x < k) = 0.1$

$P\left(\frac{z}{9} < k - 100\right) = 0.1$

$P\left(z > \frac{k - 100}{9}\right) = 0.9$

$\frac{k - 100}{9} = -0.1841$

$\frac{x-\mu}{\sigma}$.00	.01	.02	.03	.04	.05	.06	.07	.08
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838

nilai yang silap = 0.1841

Nilai yang betul = 1.2 + 0.08 = 1.28
 iaitu dengan mencari nilai p = 0.1

Gambarajah 2: Kesilapan Memasukkan Nilai dari Jadual Z

$P(X < 106) = P(Z < \frac{106 - 100}{\frac{9}{\sqrt{40}}})$
 $= P(Z < 3.6515)$
 $= P(Z > 3.6515)$
 $= 0.00013$

$1 - P(Z > 3.6515)$
 from table

Jalan kerja yang betul adalah:

$$P(z < 3.6515) = 1 - P(z > 3.6515)$$

Pelajar tidak memahami sepenuhnya konsep luas rantau dalam menyelesaikan masalah kebarangkalian. Pelajar terus menukar tanda kurang (<) kepada tanda lebih besar (>) kerana terdapat sesetengah pelajar yang masih keliru dengan sesetengah ungkapan yang melibatkan tanda negatif seperti ungkapan berikut: $P(z < -3.6515) = P(z > 3.6515)$.

Gambarajah 3: Tidak Memahami Konsep Luas Rantau

Kesimpulan

Berdasarkan kajian ini dapat disimpulkan bahawa topik taburan normal piawai juga perlu diberi penekanan semasa proses pembelajaran statistik. Kekeliruan dalam istilah asas seperti sisihan piawai dan varians perlu diatasi memandangkan kesilapan nilai ini akan mempengaruhi jawapan akhir pelajar. Latih tubi dalam penyelesaian kebarangkalian menggunakan Jadual Z juga perlu dititikberatkan agar kesilapan yang sama tidak berulang. Malah penyelesaian masalah dalam mencari nilai kebarangkalian yang menggunakan konsep luas rantau perlu diberi perhatian agar pencapaian dalam topik taburan normal lebih baik. Kerjasama yang baik di antara pelajar dan pensyarah adalah diperlukan semasa proses pembelajaran dan pengajaran kerana ianya merupakan elemen yang penting dalam penghasilan

pelajar yang berkualiti. Penglibatan pelajar di dalam kelas dalam menyiapkan tugas atau tutorial yang diberi oleh pensyarah juga perlu ditingkatkan dari masa ke semasa. Maklumbalas ini adalah penting bagi membolehkan pensyarah mengetahui perkembangan dan pencapaian pelajar.

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INTEGRATED WEB BASED RECORD MANAGEMENT SYSTEM OF STUDENTS' ATTENDANCE & ASSESSMENT SUBMISSION

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ABSTRACT

Lecturers carry varieties of responsibility such as recording the students' attendance and students' assessment marks management. Currently, the lecturer manually records the students' attendance without having a proper web-based application system. Similarly for the submission of assignments or project papers, the students will be given a link by the lecturer using selected cloud. These resulted the file name uploaded by the students do not follow the standard and the lecturer need to rename manually the filename accordingly before the marking process is started. Hence, this article suggested an integrated web-based application system which the system will record the students' attendance and help the students to submit the assessments using the standard links as a one stop center for both modules. The methodology of SDLC has been applied for the system development. This web-based system has been developed using HTML and PHP programming to cater the attendance and assessments submission modules. The system has been tested to 97 students of diploma and degree students at Universiti Teknologi MARA, at Perlis branch for 1 semester. The students responded positively because the systems make the process of log in the attendance and assessment submission is easier than before. Furthermore, integration of both modules reduces the bureaucracy which make the lecturers work efficiently and feel unstressful.

Keywords: *integrated, attendance, assessment submission, web based*

Introduction

The role of lecturers not only focusing on teaching preparation, but they are also needed to manage other things such as taking attendance, giving and assess the assignments, conducts consultation, or acts as academic advisor to the students and others important tasks that need to be fulfilled (AGCAS, 2021).

At Universiti Teknologi MARA, the lecturer needs to record the students' attendance and analyse the progress of their attendance for fourteen weeks of classes. Imagine if the lecturer needs to conduct in average of 3 groups for each subject and mostly total subject assigned to each lecturer is 2 codes. A lot of clerical works need to be done just to manage the students' attendance.

In addition, the lecturer is also responsible to give assessment to each student and total of assessments depend on the subject nature. Some of the subject will be having more assessments when the weightage of the summative assessment (coursework) is higher than the formative assessment (final examination). Since the Covid-19 pandemic outbreak, the classes must be conducted as online mode. The assessment will be submitted as a softcopy and not the hardcopy anymore. The links for assessment submission will be shared by the lecturer to the students through social media such as the WhatsApp or Telegram application. The lecturers complaining that the assessment submitted by the students to the

cloud does not follow the standard as stated in the instructions such as the filename is not consistent, varieties of file format and size. Hence, the lecturer needs to manually rename the file name and repair some of the files. This become very tiring and exhausted to the lecturer if number of students are many.

According to the studies on lecturers are burnout during the Covid-19 pandemic conducted by (Panisoara, 2020), the lecturers had to cope with many stressors within their professions including the ambiguity of their roles, difficulties in class management and exhaustion from teaching online.

This article will share an innovation which combine the attendance and assessment submission as a comprehensive web-based application. This online system will help the students to record the attendance and submit the assessment easily and no issues of inconsistencies of file format or corrupted file submitted by the students. In addition, the workload of the lecturer will be reduced because most of the clerical tasks will be processed by the system.

Generally, the organization of this paper is started with a brief introduction of the project title. Next, this article explained some of the related research or previous works that have been conducted. The research methodology will be further explained before the analysis and discussion of the project are elaborated. Finally, the project future enhancements will be recommended as conclusions.

Literature Review

Many of higher education institutions had implemented the Student Attendance Management System which include Internet systems like web-based, mobile-based system and others computerized attendance system with embedded hardware technology such as fingerprint, iris-based, face recognition, RFID (Radio Frequency Identification) and Bluetooth (Jacki, et. all, 2015). According to (Anita, et. all, 2016), the web-based Attendance Management System which using the SMS technology to send the status of students' attendance reports to their parents will increase the students' motivation and responsibility to attend the class. Some universities use the QR technology to record the students' attendance and the record will be automatically stored into the server (Anita, et. all, 2016). The QR code technology speedup the data entry process and avoid the data entry erroneous. In most of higher education institution, the lecturers will evaluate overall attendance in a semester to determine the condition of the students if there are eligible to sit the final examination (Benyo, et. all, 2012).

Quite number of universities have started to encourage the students to use the Learning Management Systems (LMS) for assessment submission. University of Southern Queensland (USQ), Australia implemented two LMS named Writely and Moodle to their students to submit the assignments (Petrus & Sankey, 2007). The students and lecturers were responded positively because both platforms make the students easier to submit the assignments and the lecturer to give feedbacks to the students. Another similar web-based system named, Automated Homework Submission System which consists of three modules User Interface Module, Submission Acceptance Module and Grader interface Module

(Sam, 1998). The system will allow the lecturers to upload the file or question paper to the students, allowed the authorized students to view the questions and participate to answer, export the marks to excel sheet, send reminder message of the assignment deadlines to students and finally share the assessments that have been marked with the students.

The article written by (Eaganathan and Maruf, 2018), had proposed a comprehensive system of assessment submission to the department of ICT at ASIA Pacific University. The submission of the assessment should be secured with the encryption algorithm and cryptography technology. The students were allowed to check the plagiarism percentage before the assignment is submitted. The assignment is allowed to be viewed by the students after the lecturer marks the assignment. The system will blast message to students either email or SMS to remind for the late submission. Hence, implementation of these features will strengthen the system integrity and improve users' satisfaction.

Methodology

The Integrated Web Based Record Management System of Students' Attendance & Assessment Submission have been developed using the common methodology called System Development Life Cycle (SDLC). The SDLC consists of five (5) phases starting the Analysis, Design, Implementation, Testing and ended with Maintenance phase (Dora & Dubey, 2013).

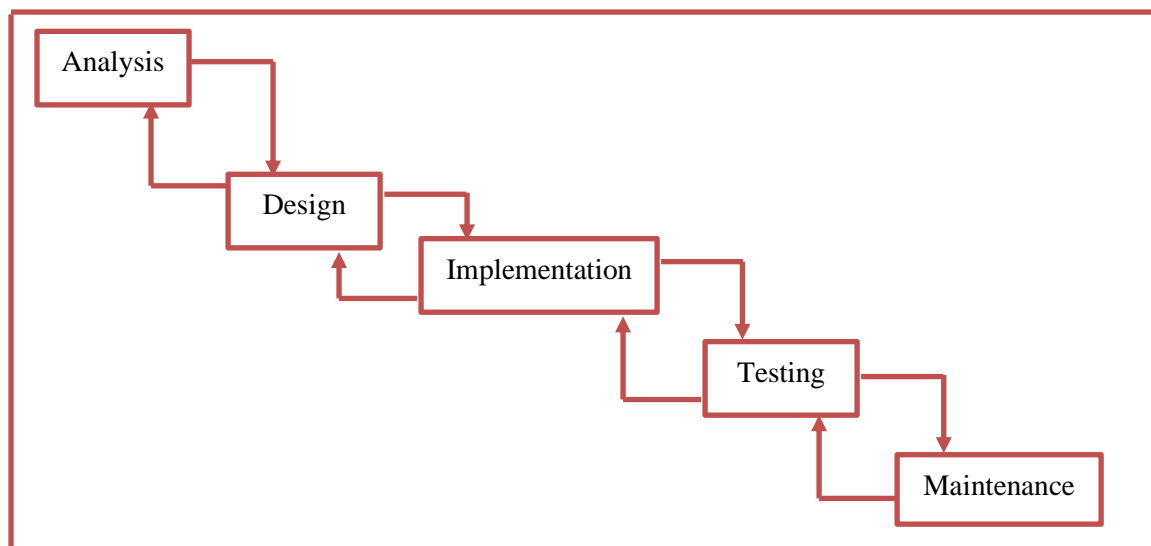


Figure 1. System Development Life Cycle (SDLC)

Figure 1 indicates that the SDLC phases are flowing from the analysis until the maintenance phase. SDLC helps the developers return to the earlier phase if they need to improvise or perform some corrective actions. Analysis is the crucial phase in SDLC. Developers must identify the business requirements. Data collections need to be validated and regularly updated and restructured with user requirements. The project problem statements need to be clearly defined so that the project objectives

are quantifiable and realizable. Interviews with the users have been conducted as the instruments of information gathering and data collection.

Analysis documentation has been presented, accepted and verified by the main users and top management. Next, the design phase continued by engaging the design of the system with database integrity framework, system interactivity, system functions, security and other related matters. The prototyping methodology is also applied to speed up the development process. Prototyping is generally used when the developer performed the design, implementation and testing phases in SDLC methodology simultaneously (Tavolato & Vincena, 1984). Prototyping method helps to reduce the project duration and overall budget. The first workable prototype will be tested by the main users and developers. Corrective actions will be taken immediately by the developers for system enhancement. Once the correction action has been taken, the system will be represented until no issues are raised by the users. Other related aspects of testing that will be considered by the developers are the database and network performance, concurrency problems, system security and integrity.

After several cycles of SDLC phases, the system is successfully implemented and now the web-based being used by 97 students of degree and diploma students at University Teknologi MARA, Perlis branch before expanded to all students at the faculty level.

Analysis and Design

The Integrated Web Based Record Management System of Students' Attendance & Assessment Submission has been developed using HTML and PHP programming language and the database of the system was designed with MySQL. As mentioned in the previous section, this web-based system consists of two modules, which the first module is to record the students' attendance, while the second system is to manage the students' assessment submission. The following table shows the list of business requirements that must be confirmed for both modules which has been stated by the users.

Table 1: List of Business Requirements Stated by Users for Attendance & Assessment Submission Modules

Attendance Module	Assessment Submission Module
<ul style="list-style-type: none"> ● The student is allowed to log in the attendance during class only. ● The student is able to upload evidence of a document if they are absent with reason. ● The lecturer is able to update the attendance if the students are forgotten to log in the system during the class. ● The student is able to view their record of the attendance. 	<ul style="list-style-type: none"> ● Only the authorized user is able to upload the assessments. ● The student will choose the type assessment that they want to submit. ● The size of file and the format has been specified. ● The student is able to check and confirm the submission of the assignment at the system.

- | | |
|---|---|
| <ul style="list-style-type: none">• The system shows the status of attendance and display percentage of attendance as of current date.• The system is able to notify an email to the students if absent.• The system is able to list records of students who were absent for a particular day.• The system allows only the authorized user to access the system.• The system allows only the specified format and size of evidence file to be uploaded.• The system allows the students to update data such as the phone number and email address.• The system will do details analysis of students' attendance records as overall performance of attendance progress report. | <ul style="list-style-type: none">• The lecturer is easily downloading the assessment submitted from the system before marking.• The assessment that has been marked is easily reuploaded to the system before returned to the students.• The students are able to check their assessment marks and download the assessment that have been marked.• The students are also able to check the overall marks or their coursework marks. |
|---|---|

The following figure 2 shows the main menu of Attendance & Assessment Management Systems or the acronym is AAMS.

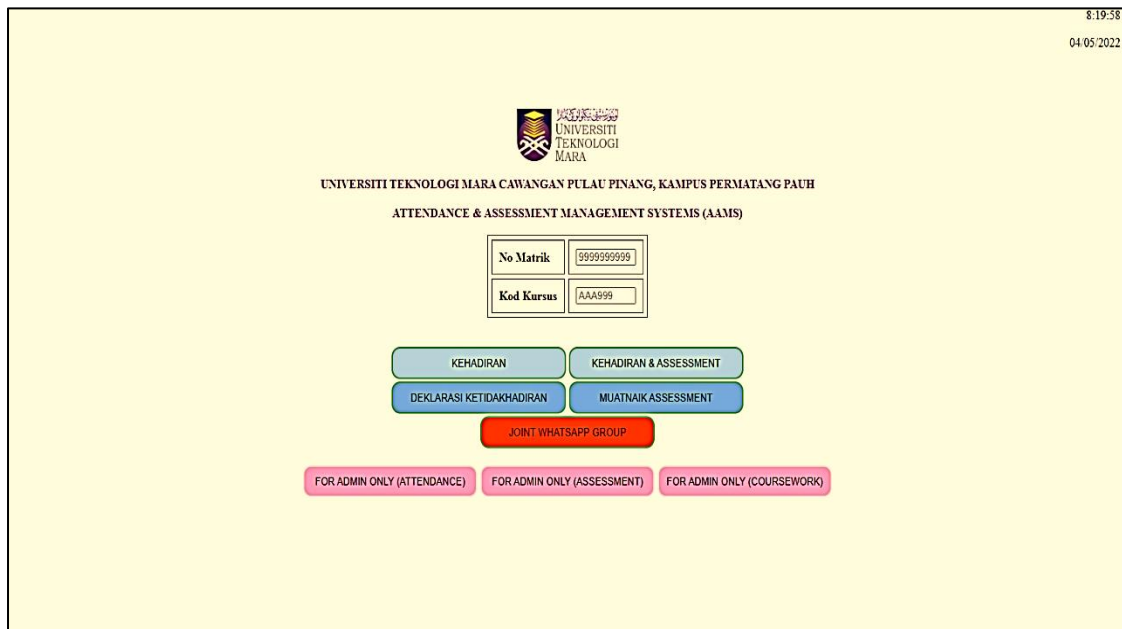



Figure 2. The Main Menu of AAMS

The main menu consists of two main modules which the module of attendance and assessment submissions. The buttons with blue color are accessible by the students, while the pink color buttons are only accessible by the lecturer or system administrator. The button with pink color cannot be seen by the students because the button has been set with the IP (Internet

Protocol) number of the system administrator. The basic profile of the students such as the student number, name, program, part and subject code are retrieved from the Student Information Management Systems (SIMS). These basic profiles are injected into the database of AAMS, so that only the authorized students are allowed to access the system. The student needs to enter the matric number and subject code whenever they want to login the attendance. Once successfully logged in, the system will record the time stamp of the login attendance into the system. The system only allowed the students to log during the time that has been allocated or the slot of the class.

The following diagram, figure 3 shows the interface for the students to declare evidence of absenteeism.

8:35:08
04/05/2022


UNIVERSITI TEKNOLOGI MARA
DEKLARASI KETIDAKHADIRAN PELAJAR

* Sebab ketidakhadiran :	None Culi Sakit Culi Kecemasan
* No. Pelajar :	999999999
* Kod Kursus :	None CSC415 ITS232
* Tarikh Tidak Hadir :	None 04/04/2022 05/04/2022
* Muatnaik Dokumen :	Choose File No file chosen

* Wajib dimasukkan. Sila pastikan fail format PDF sahaja yang boleh dimuatnaik serta saiz fail tidak melebihi 2MB.
 * Pastikan nombor pelajar dan kod kursus yang dimasukkan adalah betul dan tepat.
 Jika saiz fail PDF melebihi 2MB sila klik di [sini](#) untuk mengemukakan saiz fail terlebih dahulu NEW

Figure 3. Interface to Upload the Evidence of Absenteeism

This interface only allows the students to upload the evidence in PDF format and size of the file not exceeding 2 MB. The system will allow the evidence to be uploaded whenever the matric number is valid, the time slot of absents are exists in the system and will not accept the evidence if the student is already logged for attendance for that particular slot or date. The concept and interface for assessment submission is similar with the declaration of absenteeism evidence interface.

The students are able to view their attendance records and assessment submissions as shown in the following diagram 4. The following interface is needed because the students are able to check

whether their attendances are recorded properly and the assessments are successfully submitted to the server.

Figure 4. Interface of Students Attendance and Assessment Submissions Records

ATTENDANCE & ASSESSMENT MANAGEMENT SYSTEMS (AAMS)

Nombor Matrik : 2020626504
 Nama Pelajar : ALIN AFINA BINTI JEMSUL
 Kod Kursus : ITS232
 Kumpulan : RCS1434E
 No. Phone : 0193737092
 Email Address : alinafinaaa@gmail.com

REKOD KEHADIRAN

#	Tarikh	Hari	Masa	Catatan
1	30/03/2022	RABU	14:54:02 PM	
2	06/04/2022	RABU	14:03:59 PM	
3	13/04/2022	RABU	14:06:07 PM	
4	20/04/2022	RABU	14:02:04 PM	
5	27/04/2022	RABU	14:02:01 PM	

Peratus Kehadiran Keseluruhan : 17.86%

REKOD PENYERAHAN ASSESSMENT

#	Masa Penghantaran	Assessment	Nama File	Markah
Tiada rekod dijumpai				

From the same interface, the students are able to check the percentage of attendance and their status. For Universiti Teknologi MARA (UiTM) the percentage of absenteeism should not exceeding 80%. Otherwise, the students will be barred for taking the final examination. The students are also able to check their assessment results and downloads the assessments that have been marked by the lecturers. This interface is a one stop page which the attendance and coursework mark progress can be examined or observed by the students.

For the administrators or lecturers, they are also being given a special privilege to examine the progress of students’ coursework marks and attendance performance as shown in the following interfaces figure 5 and figure 6 respectively.

UNIVERSITI TEKNOLOGI MARA CAWANGAN PULAU PINANG, KAMPUS PERMATANG PAUH

ATTENDANCE & ASSESSMENT MANAGEMENT SYSTEMS (AAMS)

=====
 Rekod Kehadiran Terperinci
 =====

#	No Matrik	Nama Pelajar	Kod Subjek	Kumpulan	Tarikh Kehadiran	Jumlah Kehadiran	Peratusan Kehadiran	Dokumen MC/EL	Catatan
1	2020497986	AFIFAH ZUHAIKHAH BINTI ZUHAIKHAH (0192844809)	ITS232	RCS1434A	28/03/2022, 29/03/2022, 04/04/2022, 05/04/2022, 11/04/2022, 12/04/2022, 18/04/2022, 25/04/2022, 26/04/2022,	9	32.14%		BAR
2	2020469306	AFZA IRDINA BINTI YUSOF (0182057696)	ITS232	RCS1434A	28/03/2022, 29/03/2022, 04/04/2022, 05/04/2022, 11/04/2022, 12/04/2022, 18/04/2022, 25/04/2022, 26/04/2022,	9	32.14%		BAR
3	2020625704	AHMAD HASIF HAIKAL BIN MOHD SUHAIMI (0193704623)	ITS232	RCS1434A	28/03/2022, 29/03/2022, 04/04/2022, 05/04/2022, 11/04/2022, 12/04/2022, 18/04/2022, 25/04/2022, 26/04/2022,	9	32.14%		BAR

Figure 5. Interface of Students Attendance Performance

UNIVERSITI TEKNOLOGI MARA CAWANGAN PULAU PINANG, KAMPUS PERMATANG PAUH							
ATTENDANCE & ASSESSMENT MANAGEMENT SYSTEMS (AAMS) COURSEWORK DETAILS							
SENARAI MARKAH KERJA KURSUS							
#	No Matrik	Nama Pelajar	Kod Subjek	Kumpulan	Assesment	Markah	Jumlah Markah
1	2020497986	AFIFAH ZUHAIKRAH BINTI ZUHAIKI (0192844809)	ITS232	RCS1434A			0
2	2020469306	AFZA IRDINA BINTI YUSOF (0182057696)	ITS232	RCS1434A			0
3	2020625704	AHMAD HASIF HAIKAL BIN MOHD SUHAIMI (0193704623)	ITS232	RCS1434A			0
4	2020876892	AININ SABIHA BINTI MOHD SAYUTHI (019-7914249)	ITS232	RCS1434A			0
5	2020604464	AQILAH NUWAIKRAH BINTI AMIZUL ANUAR (01161708226)	ITS232	RCS1434A			0

Figure 6. Interface of Students Coursework Marks
(All marks shown are 0 mark because the assessments submitted are not finished marked yet)

The feedback given by the students and lecturers are very encourage able because most of the students responded that systems had eased the process of taking the attendance and the submission of the assessments. The lecturers are also responded positively because since the Open Distance Learning (ODL) classes are conducted, it is quite tedious to handle the submission of assessment and to analyse the students' attendance. The highest and positive impact that can be seen from the system is the part of automatic calculation and analysis of students' attendance will be done in a second.

The followings table 2 shows, the three questions that have been asked to the students on the system acceptance level and the mean obtained for each question. Based the table 2, it shows that the students acceptance level is almost reaching 4.00, whereby the Likert scale 0 to 4 have been applied to answer the three questions below.

Table 2. Analysis of System Acceptance

Questions	Mean
1. Overall, the assessment submission module is fulfilled.	3.89
2. Overall, the students' attendance module is fulfilled.	3.95
3. Overall, the analysis of students' attendance and coursework mark is fulfilled,	3.91

Conclusion

As a conclusion, the system has increased the satisfaction level of among students and lecturers after this system is successfully implemented. This system will be expanded to the faculty level once the special committee approved the system functional.

Enhancement of the systems have been suggested by the lecturers to improve the system such as providing the features of reminder notification to the students whenever they are absent. Through this feature at least the students are alert about the importance of attending the class. The same feature will be applied for assessment submission module whenever the students did not submit the assignment until the due date is reached.

Security of the system is another important feature which the assessment submitted to the system is not easily accessed by the unauthorized user. The developer of the system will ensure that all assessment will be encrypted and cannot be viewed by unauthorized user unless the permission is given by the system administrator. Similar method is applied for viewing the details individual coursework marks which only can be viewed by the respective lecturer and authorized student. Our team believes that this system will improve the satisfaction index level among lecturers and students. Hence, the university education quality will become a benchmark to other higher education institutions.

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IDENTIFYING IDEAS THROUGH SCAMPER TECHNIQUES FOR EXAMINATIONS INVIGILATION MANAGEMENT SYSTEMS (ExIMS)

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ABSTRACT

The SCAMPER technique is a productive and versatile technique for generating innovation ideas for product or service. The purpose of the study was to implement the SCAMPER technique into the examination system at the UiTM Penang Branch's Examination Unit. This study demonstrates how the SCAMPER technique ideas can be used to examine an offering from seven different perspectives. The SCAMPER technique was preferred, firstly because it basically aims to create numerous ideas which is expected from divergent thinking process. Second, although there have so many studies about creative thinking strategies in creative literature, there are only a few studies about teaching creativity via SCAMPER. Third, SCAMPER provides an enjoyable environment for thinking creatively. Also, this study attempts to propose improvements in the smoothness of the process. The SCAMPER technique was found to be useful as an idea for determining users' requirements regarding the examination duties exchanged among invigilators in this study. Therefore, the SCAMPER technique is very helpful in ensuring that the Examination Invigilation Management Systems (ExIMS), saves a lot of time.

Keywords: SCAMPER, ideas, process, ExIMS

1.0 Introduction

Creative thinking and problem-solving are essential components of the design process for transforming ideas into innovation and overcoming creative barriers. Creating new ideas to develop a product or service is an important business skill (Elmansy, 2015). It allows you to stay ahead of the competition while also keeping your audience satisfied. However, when you're focusing on an existing product, it can be difficult to come up with new ideas. An idea is something that sometimes comes easily to mind, but other times things start to go wrong. In both cases, SCAMPER can assist you in innovating and improving your products on the market.

One of the most effective tools for creative thinking is the SCAMPER approach. While there are several approaches to creative thinking and problem solving available, such as reversed brainstorming, the six hats of critical thinking, and Lego Serious Play, SCAMPER is one of the simplest

and most straightforward. The SCAMPER approach is based on the simple premise that what is new is merely a variation on what is already old around us. According to Eberle (1996), the letters SCAMPER, which stand for "Suggestion, Combination, Adaptation, Modification, Put to Other Use, Eliminate and Rearrange/Reverse," stand for seven different strategies.

Invigilation of the examination is an important activity in exam season. Appointed examination invigilators are required supervise based on the duty schedule provided by the Unit Examination. The invigilator must find a replacement and complete a Form Exchange of Supervision if they are unable to work on the scheduled day. Before such supervision is agreed upon, the form must be submitted and confirmed by an officer in the Examination Unit. Therefore, SCAMPER technique was preferred, firstly because it basically aims to create numerous ideas which is expected from divergent thinking process. Second, although there have so many studies about creative thinking strategies in creative literature, there are only a few studies about teaching creativity via SCAMPER. Third, SCAMPER provides an enjoyable environment for thinking creatively.

2.0 Related Works

The SCAMPER method and Design Thinking are quite similar in that they both emphasize problem-solving. Design Thinking, on the other hand, puts the human factor first and seeks to find novel solutions to problems. The SCAMPER method is primarily focused on the process of developing original concepts, finding unusual and creative solutions to problems, and improving a good or service. The SCAMPER approach is primarily concerned with the process of coming up with novel ideas, solving issues in uncommon and inventive ways, and enhancing a good or service. The SCAMPER method encourages people to pose seven different types of questions, which can help to understand how people may improve and innovate on already-existing products, services, problems, and ideas. As a result, it will encourage people to come up with ideas for new products and services.

Designing and implementation of a Smartphone App providing the SCAMPER method is one of the studies done by Lee and Jung (2013). In their study, they enhance their creativity by using the SCAMPER method to improve the App that was suggested for Smartphone users. As a result, several enhancements for effective usage in terms of value, use, content, and component were developed.

Plichta, Nadolny and Gierszewska (2018) in their study modified abrasive tools made for machining of hard-to-cut materials using the Scamper method. They modified current products innovatively using the Scamper method, targeted at modernising their construction, design and an extension of functions. As a result, a set of structural and technical solutions for new tools has been produced, meeting technological expectations, and can be the basis for potential development of hole grinding operations.

Scamper method also has been applied in dental implant. Considering the high construction costs of conventional dental implants, Chan (2017) have found that the Scamper method was also can be used to design a navigation system for dental implants. From the study, the all-in-one system that have been developed meets the needs of medical staff, improves product availability, reliability, and mobility, and provides a solution for the dental implant industry.

Another related work that applies the Scamper method is the study done by Phyoe and Suh (2021) where Contemporary menswear fashion designs were developed based on the characteristics and design elements of Myanmar traditional clothing. The specific questions on each element of the SCAMPER were combined with elements of fashion design, which resulted in the modernization of traditional costumes with a greater sense of modernism.

3.0 Methodology

This study used a qualitative methodology that involved observation to identify the idea of the SCAMPER technique in developing the examination system at the Examination Unit in UiTM Penang Branch. Short interviews were conducted to gain insights into ten respondents among the group members perception of the SCAMPER technique.

The group members outlined the phases of the SCAMPER technique on the board, carried out each one, and then put their own suggestions for how to deal with the examination system. The steps of the SCAMPER technique (Glenn,1997), the purpose of each step, and the questions at each step are listed in Table 1 below:

Table 1: SCAMPER Technique

S	Substitute The purpose of this step is to interchange the object or person being considered with a different object or person.	What should be done to convert the previous examination system into complete and reuse them?
C	Combine The purpose of this step of the technique is to bring together and combine different objects	Which work can be put together in the same system?
A	Adapt This purpose of this step is to adapt the object under consideration to different situations or uses.	Do you think that the system can be implement without online access?
M	Modify This step involves changing the form of the original object by reducing or increasing its size, by changing its quality, by rendering it lighter or heavier, and/or by reducing or increasing its speed.	Does the system change the quality of the department?
P	Put To Other Use This step involves discussing the use of the object under consideration for purposes, and also at locations, that differ from was originally intended.	How could this system be used effectively to ensure that it can gives benefits to others?

E	Eliminate This step involves fully or partially removing a certain feature or section of the object that is the subject of the brainstorming.	How will the management be affected if did not used the system?
R	Reverse, Rearrange In the final step of the technique, the current state of the object will be considered, and then the object or its characteristics will be reorganized or inverted	What happened if we rearrange any parts, function or objectives?

Based on SCAMPER technique above, seven questions were collected from the respondents to generate the idea in developing the Examinations Invigilation Management Systems (ExIMS).

4.0 Finding

The Examinations Invigilation Management Systems (ExIMS) were created. The examination invigilator and secretariat were able to simplify the supervision process exchange and ensure all operations examination management is working smoothly.

Firstly, the exchange application process for supervision can be placed in a single system, namely ExIMS. Then, the examination supervision exchange process can be combined with the attendance report of the duty invigilator, the examination supervision handling report, and the student attendance. So that, the online method is being used to adapt the examination supervision exchange application. As a result, ExIMS can reduce the time it takes to find substitute invigilators from 5 days manually to 1 day online thus saving the cost of examination operation. Besides that, ExIMS can also be used in work shift change scenarios involving daily/contract employees (spin off). ExIMS can greatly help in the elimination of the supervision exchange application process due to bureaucracy. Thus, when the application process for exchange of supervision is simplified, ExIMS can have a positive impact on the reputation of the Examination Unit. Figure 1 below shows the SCAMPER technique focuses on ideas from various perspectives in ExIMS.



Figure 1: SCAMPER Technique for ExIMS

5.0 Conclusion

The SCAMPER technique was found to be useful as an idea for determining users' requirements regarding the examination duties exchanged among invigilators in this study. This technique for creative thinking and problem solving is known to aid in the creation of more qualitative ideas. Furthermore, based on a series of questions aimed at challenging the perspective, it can examine possibilities related to a service or any situation.

Thus, according to user responses, ever since the implementation of Examination Invigilation Management Systems (ExIMS), the level of user satisfaction has increased and complaints about examination duties exchanged among invigilators have dropped. The invigilator does not need to fill out the form manually to monitor the exchange and obtain the approval of the relevant officer. Therefore, the SCAMPER technique is very helpful in ensuring that this ExIMS system saves a lot of time.

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STUDENTS' VIEWPOINTS ON STRATEGIC NOTETAKING AND ITS IMPACT ON MATHEMATICAL PERFORMANCE, ACHIEVEMENT, AND LEARNING

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ABSTRACT

Taking notes is a widely used pedagogical strategy in all fields of education. Taking strategic notes benefits students because it becomes part of the way so students can learn, and it can help students show better performance in the courses studied. In higher education, there has been a strong effort to engage students in collaborative notetaking to increase their engagement with the material and inspire deeper and more meaningful learning. Take notes are strategically seen as an essential skill needed in a university environment. It involves active listening, processing information and writing. Results from several studies indicate that strategic note-taking can improve higher performance and achievement. Taking the right notes is a skill that many deficiencies by students. However, it is unclear if notetaking has a significant impact on student achievement. The objective of this research study was to determine whether strategic notetaking can increase performance, achievement and learning in mathematics subjects.

Keywords: *Note taking, mathematics, performance, achievement, skills*

Introduction

Take notes play an important role in gaining knowledge, learning and success in a course. In higher education, student notetaking is recognised as an effective approach for improving student learning (Wu, 2020). Aside from the advantages of taking notes for oneself, research has shown that sharing notes, as well as taking or reviewing notes in groups, may be advantageous. Kiewra (1989) discovered that individuals who borrowed notes from non-attending attendees fared equally on evaluation measures to those who took and read the notes themselves. Students who cooperated with a partner to modify their notes captured more unique and full material, according to Luo et al. (2016).

Boyle (2011) investigated the "effects of taking on notes recorded, a delayed recall measure, and a test" in the situation that "most students are strategic notepoor notetakers" (p. 58). According to the findings of Boyle's study, "students who utilised strategic note taking captured much more notes and fared better on success metrics than students in the control group" (p. 64).

In a study conducted by Hoong, Guan, Seng, Fwe, Luen, Toh, and Teck (2014), 25% of students identified as Normal Academic following their Year 6 examination provided information about the

academic areas that needed to be targeted when designing interventions to improve their mathematics learning. They "identified "study habits" as one domain of careful consideration," which included "doing homework on a regular basis, taking careful notes in class, being attentive when the teacher is explaining, and asking the appropriate questions, among other things" (Hoong, et al., p. 22). It is obvious that instructors must go beyond simply teaching the information; they must also make a point of emphasising these critical notetaking and study skills. According to Castello and Monereo (2005), notetaking is the main university study activity and, in many situations, the primary platform for teacher-student contact. This finding has generated a significant interest in researching students' note-taking habits and how they affect their learning. In general, three research lines have emerged in the last 40 years: the effects of note-taking and note-rewriting on some cognitive variable (attention, memory, comprehension, and so on); the relationship between note quality and learning significance; and changes in teaching methodology that may improve note-taking.

Taking effective notes are so important. Why?

In school and university, taking notes is an important learning tool. Memory can only take in and keep information until it is replaced by new information. This implies that genuine, long-term learning happens outside of class, in between classes, and as you study. Carefully structured notes provide you with a permanent record of a class as well as the ability to comprehend and learn what you've heard. Do you write down every single word your instructor says in class? Do you only take notes when your instructor writes something on the board? When it comes to good note-taking habits, there is a happy medium that can pay dividends with a higher GPA. Here's how to take better notes in class and ace your next exam.

- (1) It keeps you awake. Note taking forces you to pay attention and helps you focus on class (or while reading a textbook).
- (2) It helps your understanding. According to studies on learning, actively interacting with a topic by listening and then summarising what you hear helps you grasp and recall the knowledge later.
- (3) It aids in the keeping of a record. You were in math class on Tuesday, but that doesn't guarantee you recall what happened (and what might appear on a quiz). Notes are a record of what you learnt in class—as well as what you need to go over again.
- (4) It will help you study. Review your notes regularly to get the most out of them. You can use them to make up sample test questions or even turn them into digital flashcards.

It's a skill that will pay off in university. Are you used to your instructor handing out outlines or e-mailing copies of their PowerPoint presentations? That's NOT going to be the case in university. Learn the art of note taking now to give yourself a leg up later.

Related work in note taking effect performance and students' grade

This study emphasised and explained the impact of strategic notetaking as well as how to improve learners' notetaking levels for improved academic performance. Therefore, notetaking research indicates that taking notes in class and analysing those notes has a good influence on students' academic achievement. To summarise, note taking enables and greatly improves learners' recollection of lecture information, which directly helps to enhance students' academic achievement. Numerous research has been completed, and the results are now available as an essential record on strategic notetaking (Ogunmakin, 2011; Gbore, 2006, Kumar, 2002).

According to Spires (2011), note taking should be a key component of the curriculum, and Liu (2015) emphasised that notetaking is a beneficial method for students to improve their listening comprehension. Most studies, predictably, support students' capacity to recall more lecture content if they write it in their notebooks (Leyson et al., 2016). Language instructors Muraina et al. (2015) and Senkowski (2016) examined notetaking from several perspectives. Several studies have revealed that taking notes has a major impact on learning performance.

Hale & Courtney (2017) found that out of thirty-five studies on the impacts of note-taking, seventeen past studies obtained that the note takers done better than the non-note takers, sixteen studies establish no difference, two studies realised that note-taking affected performance and remaining studies specify that note-taking has no effect on the learners' performance. Furthermore, Kiewra, Benton, and Lewis (2014) reported that students who took notes scored higher on both immediate and delayed assessments than students who did not take notes. However, he stated that undergraduates who did not attend the lecture but instead gathered notes from other students performed higher than those who did not check notes. However, several reports indicate that students fail to record 40% of the central discussion as class note. due to higher rate of verbal communication than material written on the blackboard during the class lecture (Howe, 2017; Muraina et al., 2015).

The researchers claimed that strategic notetaking has a convincing relationship with students' academic performance, whereas other academics (Muraina, 2013; Owolabi, 2006) established that it was the combination of strategic note-taking and other issues that could clarify students' academic performance in any course of study. Kiewra and Benton (1988) investigated the link between lecture

note-taking activities and academic ability. They concluded that the number of words, complex propositions, and main ideas recorded in notes are related to academic achievement, and the ability to hold and manipulate propositional knowledge in working memory is related to the number of words, complex propositions, and main ideas recorded in notes.

Conclusion

Concerning taking notes in lectures, in a study Dunkel and Davy (1989) concluded that understanding the views of students on note taking in lecture, and the considerable variation in how they conceptualise lectures, provides many insights into this component of academic literacy and, they would argue, is a necessary adjunct to other kinds of research in this area. According to Bakunas and Holley, students should be taught note-taking abilities in the same manner that writing or computer skills are taught (2001). Teachers should demonstrate the desired outcome, and students should have the opportunity to practise and receive feedback. The teacher should not assume that the students understand how to take good notes.

- (1) Students should be taught several note-taking techniques to improve their speed and understanding.
- (2) Use tools and strategies that help students take better notes, such as introducing brief breaks during lectures, sharing lecture notes with students, and videotaping lectures.
- (3) Be informed of new initiatives in the field of note taking and to take use of the findings of this research by incorporating them into their classroom in ways that best suit their students' requirements.

When utilised effectively, note-taking is often recognised as a valuable learning tool. Many students believe that taking notes has a positive influence on their academic performance. (Kobayashi, 2005). According to Van Meter, Yokoi, and Pressley (1994), Students believe that taking notes in class helps them pay attention in class, understand what they're learning, and remember what they've learned. Some lecturers think that simply teaching students how to take notes is sufficient. Instead, they suggest that educators coach students in a specific note-taking style or method. The Cornell Method, the Unified Note-taking System, and the Split Page Method, according to Stahl et al. (1991), are all successful. The Split Page Method is recommended by Spires and Stone (1989) and Bakunas and Holley (2001).

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REVISING THE USED OF GUIDED NOTE TAKING IN MATHEMATICS CLASSES

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ABSTRACT

Learning mathematics in the lecture room is a process that is influenced by the role of teachers and students as individuals who are directly involved in this learning process. As an intermediary, the teacher must know where the source of information for certain knowledge is and control the mechanism to get it if students need it at any time. The students must take notes. However, there are serious problems concerning students' notetaking in traditional mathematics lectures. Making sense of the content later is also difficult because many students do not include the lecturer's oral explanations in their notes. One approach to addressing these problems can be the use of guided notes: a modified version of the instructor's notes with certain blanks the students must fill in during the lecture. The purpose of this exploratory study was to understand the potential usefulness of guided notes in mathematics courses. With guided notes, the instructor provides some type of outline of the material to be covered, but with space left for students to complete key information. The notes combine typed information, handwritten content, and graphics, but still leave room for student notes and working out example problems. Diagrams are pre-drawn, but some key numbers are left out for students to fill in during the lecture. These notes consolidate all the technical material for a lecture into a single document, and the information is organized to align with the lecture. In this study, the usefulness of this method has been reviewed and how well they balance the efficiency offered with the need for students to actively participate in the encoding process.

Keynote: Guided notes, mathematic, notetaking, information, technical

Introduction

Every day, students take notes in classes all throughout the world. When we think about notetaking, it's natural to assume a context of lecture-based lessons. And, surely, that is a common scenario in which a student will take notes. But other learning experiences also lend themselves to note-taking: Watching videos in a flipped or blended environment, reading assigned textbook chapters or handouts, doing research for a project, and going on field trips can all be opportunities for taking notes. However, the literature suggests that in mathematics lectures students' notetaking is often limited to writing down the definitions, theorems, and proofs the instructor has written on the board (Weber, 2004). Students are often just busy copying everything correctly instead of paying attention to the lecturer's explanations (Freitag, 2020). The teacher, as an intermediary, must know where the sources of information for specific knowledge are and regulate the acquisition mechanism if students require it at any moment (Saud & Suherman, 2006). Teachers assist students in developing their abilities to respond to their circumstances through the acquisition of information and knowledge.

Providing students with parts of the lecturer’s notes as a compromise between requiring them to take their own notes and providing them with the lecturer’s full notes has been suggested in the literature since the 70’s (Collingwood & Hughes,1978). Collingwood and Hughes (1978) used the term partial notes, a phrase that still appears in more recent studies (Cardetti et al., 2010; Cornelius & Owen Deschryver, 2008). The term guided notes were first defined by Heward (1994) as “teacher prepared handouts that guide a student through a lecture with standard cues and specific spaces in which to write key facts, concepts, and relationships” (p. 304).

These are reprinted lecture notes with blanks at certain places that the students are required to fill in as the lecture progresses (Austin et al., 2004). Guided notes can offer a way to involve the identified learner, help them focus on what is important, remove negative stigma for accommodations, and the identified learners to practice their note-taking skills. Guided notes are handouts created by the lecturer that include previous knowledge, normative signals, and designated spots for students to record important material during lectures. Guided notes require students to actively reply during the lecture, improve students' notetaking accuracy and efficiency, and promote students' memory of course content. It can help organize and enhance lecture content in any discipline or subject area. Instructors can develop guided notes for a single lecture, for one or more units within a course, or for an entire semester-long course. Under the linear style, guided notes are a subcategory of the outline approach. They are basically a pre-planned organiser that allows students to follow the flow of a lecture and fill in the blanks by hand. Students follow along with the lecture and fill in the missing information. These notes are already organized in a structure that indicates importance thus relieving the student of precious working memory space. Figure 1 below demonstrates the use of guided notes in a special education math class.

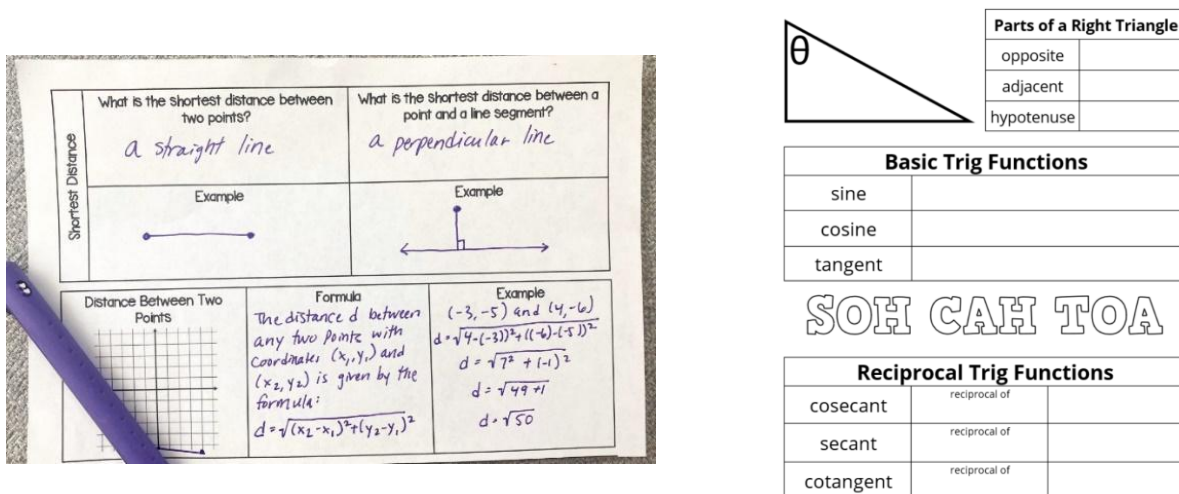


Figure 1: Sample of Guided Notes

Why should use guided notes in mathematics

- 1) Many students were not taught how to take accurate notes in elementary and middle school. Unfortunately, there is so much knowledge to teach in all subject areas that teaching notetaking, particularly in mathematics, falls by the wayside. Here's where guided notes come in handy.
- 2) Most student mathematics notes are disorganised. When students need to utilise them as a reference tool, they can be difficult to understand. When students are given a guided notes package for each unit of study, it is simple to keep them organised.
- 3) Guided notes make it simple for the teacher to determine if students are staying on track. They also make it clear when and if a student has tuned out the debate.
- 4) If a student is absent or misses a mathematics class, they may simply see what they missed and obtain the missing notes from the teacher or another student for future reference. They can make a note of what doesn't make sense to them and seek assistance in those areas.
- 5) Guided notes are an excellent resource for independent practise and study. They are also an excellent resource to bring to tutoring to help the tutor understand where the student is suffering.

The Advantages of using Guided Notes

- Students who take detailed notes and study them later routinely beat students who merely listen to the lecture and read the text (Baker & Lombardi, 1985; Carrier, 1983; Kierwa, 1987; Norton & Hartley, 1986). Inaccurate and incomplete lecture notes are of limited value for subsequent study. Guided notes can help level the playing field between students with and without good notetaking skills.
- Students' full engagement in course content evolves. Students must actively respond to the lecture's content by listening, seeing, thinking, and writing to finish their guided notes.
- Students are better able to determine the most important facts. Students can better assess if they are absorbing the most important knowledge since guided notes trigger the location and number of significant concepts, facts, and/or relationships.

- Students achieve higher quiz and test results. Experiment after experiment has repeatedly proven that students of all abilities and ages/grade levels receive higher test scores while using guided notes than when taking their own notes (Austin et al., in press; Heward, 1994)
- Students can use guided notes as an advanced organiser. Some students have stated that reading the lecture topics prior to attending class is beneficial.
- Guided notes inform students about what is expected to happen next, teachers are less likely to stray from the planned content. When a teacher does wander, both the teacher and the students understand that the knowledge is at best supporting context or enrichment, rather than important course content for which the students will be held accountable.
- Help instructors prioritize and limit lecture content. Many instructors try to pack their lectures with too much information. Constructing guided notes requires decisions about what is important, what the key concepts are that the instructors want their students to learn.

Conclusion

The guide note taking method is a method used in the learning process by which the teacher provides a prepared form or sheet, this sheet instructs students to take notes while the teacher teaches (Silbermant, 2009). From these definitions, it can be concluded that guide notes taking learning is learning that uses guided charts or notes that require students to be able to understand problems and solve problems, students are expected to be able to conclude, define, formulate, and think in general. Cardetti, Kamsemanan & Orgnero (2010) suggest that providing students in mathematics classes with guided notes is beneficial to their learning. The students' voluntary comments about guided notes showed their appreciation for the method. Students emphasised the importance of guided notes in keeping them engaged with the lecture, providing opportunity to participate actively in class, and effectively reviewing for exams. In addition, the comparison of the examination scores suggests that guided notes might have been a factor contributing to the improved student performance.

When faced with the direct delivery of mathematics teachings, the condition of students will become something abstract when accepted by students, resulting in many students whose scores do not meet the aim. There must be a suitable remedy for this situation to not be continued. The teacher's responsibility as a motivator is to find new ways to improve pupils' learning motivation. The guide note taking learning approach is one strategy that can be applied.

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PENCAPAIAN PELAJAR PRA SAINS DALAM MATEMATIK: HUBUNGAN DI ANTARA MARKAH PENILAIAN KERJA KURSUS DAN PENILAIAN AKHIR

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ABSTRAK

Matematik asas yang dipelajari semasa di sekolah menengah adalah amat penting untuk di aplikasikan di peringkat yang lebih tinggi. Dalam memastikan pelajar lebih bersedia, matematik yang dipelajari di peringkat pra sains adalah merangkumi asas matematik dan juga matematik tambahan. Penilaian kursus matematik yang dibuat juga adalah berdasarkan kerja kursus dan peperiksaan akhir. Walaubagaimanapun masih terdapat segelintir pelajar yang tidak memperolehi markah yang baik dalam kedua-duanya. Justeru itu kajian ini dijalankan bagi melihat hubungan di antara markah kerja kursus 1,2 dan 3 terhadap markah peperiksaan akhir pelajar pra sains bagi subjek Matematik. Dapatan kajian menunjukkan terdapat hubungan yang signifikan bagi tugas 1 dan 2 terhadap markah peperiksaan akhir. Tren hubungan yang diperolehi berdasarkan nilai r adalah hubungan positif yang baik. Ini menunjukkan bahawa, peningkatan markah dalam kerja kursus akan juga berlaku peningkatan markah pelajar dalam penilaian akhir. Walaubagaimanapun, pelajar perlu lebih berusaha dalam meningkatkan prestasi dalam matematik kerana markah yang baik dalam kerja kursus juga tidak menjamin pelajar memperolehi markah yang baik dalam peperiksaan akhir sekiranya sikap malas belajar masih ada dalam diri pelajar.

Kata kunci: *asas matematik, kerja kursus, matematik, penilaian akhir, nilai r*

Pengenalan

Matematik merupakan salah satu subjek yang penting di mana ianya mula dipelajari dari peringkat awal persekolahan sehinggalah ke peringkat tinggi. Namun, sering diperkatakan pencapaian matematik kurang memuaskan. Kemerosotan pencapaian dalam subjek matematik perlu ditangani agar pencapaian terus meningkat dari masa ke semasa. Menurut Montague dan Garderen (2003), subjek penguat kepada kursus kejuruteraan adalah subjek matematik. Pencapaian matematik yang merosot ini perlu diteliti agar para pendidik dapat mengenalpasti masalah yang dihadapi oleh pelajar dan seterusnya dapat memberi lebih perhatian terhadap tugas ataupun penilaian yang diberikan kepada para pelajar.

Terdapat pengkaji menemui bahawa pencapaian matematik yang baik semasa SPM boleh mempengaruhi pencapaian matematik yang diambil bagi peringkat permulaan pada tahap pengajian yang lebih tinggi (Nor Haizan et al., 2019). Kajian Norhani (2005), juga menemui dapatan yang sama di mana pelajar yang mendapat gred matematik yang rendah akan mempengaruhi pencapaian di peringkat yang tinggi. Nor Haizan(2019), juga mengkaji korelasi di antara matematik kejuruteraan 1, 2, 3 dan mendapati bahawa ada perkaitan di antara ketiga-tiga subjek namun korelasi positif yang

diperolehi tidak terlalu tinggi kecuali bagi matematik kejuruteraan 1 dan 3 sahaja memberi nilai yang lebih tinggi berbanding yang lain iaitu $r = 0.692$.

Namun begitu, ada kajian mendapati bahawa pencapaian matematik tambahan semasa SPM kurang mempengaruhi pencapaian matematik di peringkat pembelajaran yang lebih tinggi (Wan Izyani et al., 2020). Kajian oleh Wan Izyani et al. (2020), juga menyatakan bahawa kemungkinan pencapaian sederhana ini dipengaruhi oleh faktor keberkesanan semasa proses pembelajaran dan pembelajaran bermula dari subjek matematik kejuruteraan 1 sehingga 3. Ia juga mungkin disebabkan kurangnya tahap kesedaran di dalam matematik seterusnya boleh menyebabkan kurangnya tahap kemahiran matematik oleh pelajar tersebut.

Kajian oleh Siti (2022), menemui bahawa gred bagi subjek statistik kurang dipengaruhi oleh gred matematik tambahan semasa SPM. Begitu juga dengan pencapaian matematik moden semasa SPM juga tidak mempengaruhi markah dalam subjek statistik di peringkat ijazah sarjana muda. Dengan ini, tidak terdapat bukti yang kukuh untuk menyatakan bahawa terdapatnya perkaitan keputusan matematik semasa dengan keputusan dengan matematik yang diambil bagi peringkat sebelumnya. Pencapaian markah matematik juga boleh dikatakan tidak ada perkaitan dengan pencapaian matematik sebelumnya namun terdapat faktor lain yang mempengaruhi pencapaian tersebut contohnya seperti pelajar hanya meminati topik tertentu sahaja. Ini juga boleh mempengaruhi markah bagi penilaian dalam tahun yang diuji kerana pelajar tersebut hanya mendapat markah yang baik bagi sesetengah topik sahaja. Pelajar perlu menanam minat dalam setiap perkara yang dipelajarinya supaya dapat mencapai prestasi yang cemerlang dari masa ke semasa.

Metodologi

Kajian ini dijalankan terhadap semua pelajar pra sains iaitu seramai 46 orang pelajar yang mengambil subjek matematik. Kerja kursus yang dinilai adalah merangkumi kuiz, ujian dan tugas beserta peperiksaan akhir. Jumlah markah yang dianalisa bagi setiap penilaian bagi kerja kursus dan peperiksaan akhir masing-masing adalah 50 markah. Jadual 1 berikut menunjukkan pembahagian topik yang dinilai untuk kerja kursus yang terlibat. Peperiksaan akhir adalah melibatkan semua topik yang dipelajari sepanjang semester.

Jadual 1: Penilaian kerja kursus yang terlibat mengikut topik

Kerja Kursus	Perkara	Topik terlibat	Markah
1	Kuiz	Set, Index, Logaritma, Janjang	15
2	Tugasan Berkumpulan	Logaritma, Statistik	15
3	Ujian	Statistik, Fungsi, Ketaksamaan, Matriks	20
		Jumlah	50

Data yang diperolehi adalah jantina dan markah pelajar bagi setiap kerja kursus yang di nilai dan juga markah peperiksaan akhir. Analisa deskriptif yang dijalankan adalah min, sisihan piawai dan juga graf. Manakala analisa yang melibatkan inferensi statistik adalah korelasi. Korelasi dijalankan bagi melihat sama ada terdapat hubungan linear yang positif atau negatif bagi pembolehubah tak bersandar, x iaitu markah bagi kerja kursus 1,2 dan 3 dengan pembolehubah bersandar, y iaitu markah penilaian akhir.

Nilai pekali korelasi r yang di perolehi pula adalah untuk melihat kekuatan atau tren antara dua pembolehubah yang terlibat. Jika $0 < r < 1$ maka terdapat tren linear positif dan setiap data bertaburan di sekitar garisan yang paling sesuai; semakin kecil nilai mutlak r semakin kurang baik data boleh divisualisasikan dengan satu perhubungan linear. Jika r adalah positif maka peningkatan dalam nilai satu pembolehubah dikaitkan dengan peningkatan dalam pembolehubah yang lain. Apabila $r = 0$, ia bermakna tiada perkaitan linear antara pembolehubah dan tiada komponen linear yang konsisten untuk hubungan tersebut.

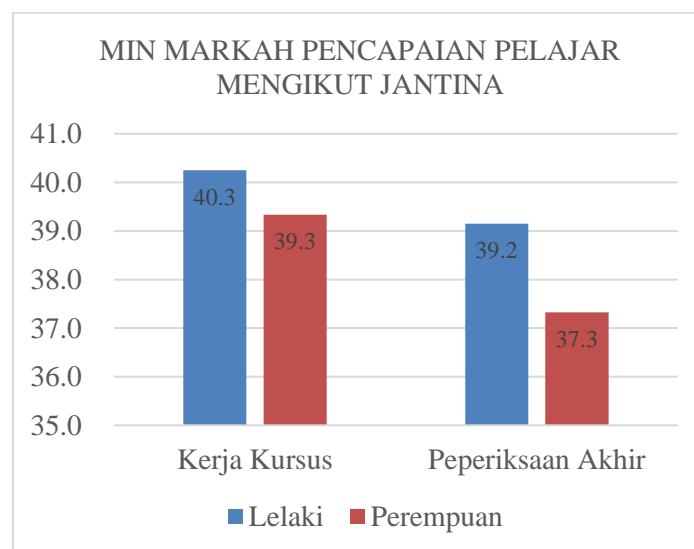
Analisa dan Perbincangan

Analisa data dimulakan dengan analisa deskriptif. Berdasarkan jadual 2, min markah bagi kerja kursus adalah 39.39 iaitu lebih tinggi daripada min markah peperiksaan akhir 37.9. Keadaan ini berlaku kerana kerja kursus bagi tugas 2 adalah dilakukan secara berkumpulan. Pelajar dapat saling berbincang untuk menyelesaikan masalah yang diberi oleh pensyarah dan dapat mengurangkan berlakunya kesalahan. Tambahan pula, penilaian kerja kursus dipecahkan kepada tiga bahagian mengikut topik-topik yang tertentu manakala penilaian peperiksaan akhir merangkumi kesemua topik yang dipelajari. Walaubagaimanapun dapat dilihat bahawa perbezaan untuk kedua-duanya adalah sangat kecil dan terdapat pelajar yang mendapat markah penuh untuk peperiksaan akhir.

Jadual 2: Analisa deskriptif min

Penilaian	N	Minimum	Maximum	Min	Std. Deviation
KERJA KURSUS	46	19.75	48.9	39.39	6.29
PEPERIKSAAN AKHIR	46	14.25	50	37.96	8.83

Rajah 1 menunjukkan bahawa prestasi pelajar lelaki adalah lebih baik daripada pelajar perempuan bagi kedua-dua penilaian. Walaubagaimanapun, beza min markah antara kedua-dua penilaian dilihat tidak begitu ketara iaitu sebanyak 2.2% bagi kerja kursus berbanding 4.1% bagi peperiksaan akhir. Berdasarkan dapatan kajian oleh Camello (2014) menyatakan bahawa pelajar lelaki lebih ramai berminat mempelajari Matematik peringkat tinggi berbanding pelajar perempuan yang jarang memilih matematik. Namun begitu, terdapat juga faktor-faktor lain yang boleh mempengaruhi prestasi pelajar dalam matematik antaranya adalah faktor persekitaran, keyakinan diri, didikan ibu bapa dan lain-lain.



Rajah 1: Min markah pencapaian kerja kursus dan peperiksaan akhir pelajar mengikut jantina

Kajian seterusnya dilakukan untuk melihat hubungan di antara markah kerja kursus iaitu tugas 1, 2 dan 3 terhadap markah peperiksaan akhir dengan menggunakan ujian Korelasi Pearson. Ujian Korelasi Pearson menyatakan bahawa, jika nilai $p <$ nilai signifikan 0.05, hubungan linear yang signifikan akan terhasil.

Jadual 3: Ujian Korelasi Pearson bagi kerja kursus dan peperiksaan akhir

Korelasi	Ujian Statistik	Tugasan 1	Tugasan 2	Tugasan 3	Peperiksaan akhir
Tugasan 1	Pearson Correlation	1			
	Sig. (2-tailed)				
Tugasan 2	Pearson Correlation	.503	1		
	Sig. (2-tailed)	0.00			
Tugasan 3	Pearson Correlation	0.091	0.188	1	
	Sig. (2-tailed)	0.546	0.211		
Peperiksaan akhir	Pearson Correlation	.679	.422	0.2	1
	Sig. (2-tailed)	0.00	0.003	0.182	

Hasil kajian yang diperolehi daripada jadual 3 menunjukkan bahawa tugasan 1 mempunyai hubungan linear yang signifikan terhadap tugasan 2 dengan nilai $p = 0.00 < 0.05$. Tugasan 1 (nilai $p = 0.00$) dan tugasan 2 (nilai- $p = 0.003$) juga masing-masing mempunyai hubungan yang signifikan terhadap markah peperiksaan akhir dengan nilai $p < 0.05$. Manakala tugasan 3 adalah tidak signifikan (nilai $p = 0.183 > 0.05$). Nilai r yang di perolehi pula menyatakan bahawa terdapat hubungan positif yang sederhana antara tugasan 1 dan 2 ($r = 0.53$). Seterusnya terdapat juga hubungan positif linear yang baik ($r = 0.679$) bagi tugasan 1 dan hubungan positif yang sederhana $r = 0.422$ bagi tugasan 2 terhadap markah peperiksaan akhir. Ini menunjukkan bahawa, semakin meningkat markah bagi tugasan 1 dan 2, markah peperiksaan akhir juga akan meningkat. Begitu juga dengan tugasan 1 dan 2. Peningkatan markah pada tugasan 1 akan juga berlaku peningkatan terhadap markah tugasan 2. Sebaliknya, tugasan 3 tidak mempengaruhi markah untuk peperiksaan akhir. Namun begitu, tugasan 3 juga adalah penting bagi menentukan prestasi pelajar pada peperiksaan akhir kerana ianya menyumbang markah yang paling banyak di antara tugasan 1 dan 2. Jadi dapat disimpulkan bahawa, tugasan 1 dan tugasan 2 banyak membantu pelajar dalam mendapat markah yang baik dalam peperiksaan akhir berbanding tugasan 3.

Kesimpulan

Secara keseluruhannya, prestasi pelajar dalam kerja kursus sedikit sebanyak telah mempengaruhi prestasi pelajar dalam peperiksaan akhir. Pelajar perlu lebih banyak berusaha mempelajari matematik bagi setiap topik yang telah ditetapkan supaya setiap tugasan yang dilaksanakan akan menunjukkan prestasi yang baik dalam peperiksaan akhir. Pelajar seharusnya mengambil peluang memperolehi

markah yang tinggi dalam setiap tugas yang diberikan kerana tugas hanya dijalankan mengikut topik-topik tertentu yang telah ditetapkan sahaja. Namun begitu, pelajar perlu juga berusaha untuk memperolehi markah yang baik dalam peperiksaan akhir kerana dengan mendapat markah yang tinggi dalam kerja kursus tidak menjamin markah yang tinggi juga di dalam peperiksaan akhir. Ini kerana jika pelajar mempunyai sikap malas belajar di saat-saat akhir, pastinya prestasi pelajar juga akan menurun. Pelajar juga perlu meningkatkan lagi ilmu asas matematik yang telah dipelajari di peringkat sekolah kerana ianya amat penting sebagai bekalan untuk meneruskan pengajian di peringkat yang lebih tinggi. Diharap kajian ini dapat diteruskan lagi bagi mengenalpasti tahap pemahaman pelajar terhadap ilmu matematik yang dipelajari supaya para pengajar dapat menyediakan bahan-bahan kursus yang lebih baik dan terkini bagi menarik minat pelajar dan seterusnya prestasi pelajar dalam matematik akan terus meningkat.

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PERSUASIVE TOOTHPASTE CONTAINER AS A FUN MOTIVATOR OF CHILDREN'S DENTAL CARE HABITS THROUGH THE USE OF PERSUASIVE TECHNOLOGY

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ABSTRACT

Most of the parents are facing difficulties in persuading or motivating their kids especially those age 2 to 5 years old to brush their teeth regularly. Technology can be used as influential tools to persuade the children. Realizing the importance of hygiene and oral health care through tooth brushing activities, as well as the potential of persuasive technology in instilling motivation without coercion, this research aims to encourage children (2-5 years) to brush their teeth in a fun way through the adaptation of the persuasive technology. Personalization, liking, and cooperation are three persuasive principles adapted from persuasive system design to encourage children (2-5 years) to brush their teeth in a fun way. Using a do-it-yourself (DIY) approach with household items such as a toothbrush, different flavours of toothpaste, a piping cake container, and nozzles to persuade children to practise good dental hygiene habits. This study's solution idea assumes that motivated children who maintain oral hygiene by brushing their teeth in a fun way on a consistent basis can naturally form self-discipline. Personalization, liking, and cooperation principles used in fun tooth brushing have a positive impact on developing children's discipline toward dental care habits.

Keywords: Persuasive System Design , personalization, liking, cooperation, dental care

Introduction

Most of the parents are facing difficulties in persuading or motivating their kids especially those age 2 to 5 years old to brush their teeth regularly. According to the research conducted in United States (US) and United Kingdom (UK), dental problem carries as one of the most common childhood diseases in the world (Pine et al. 2000). It was surprisingly, the study reported that brushing the teeth amongst kids as a routine activity seldomly unsupervised by their parents. The kids were reminded or prompted through verbal enforcement or reminded without proper observation. Parents play important roles to prevent dental problem among young children through regular preventive treatment and risk assessment regarding oral development, caries prevention, and overall oral health (Colleen & Christine, 2010).

Quite number of technologies have been innovated to encourage individuals to change behavior or attitude towards healthy lifestyle such as increase physical activity (Mohadis & Ali, 2016), healthy diet intake (Rahman et al. 2018) and smoking cessation (Bascur et al. 2018). Similar technology has been applied to change children's daily habits to prevent problem of obesity. The gamification application has been developed to persuade the children to practice healthy lifestyles such as eating healthy food and do physical activities (Alomani et al. 2014). The game will assist the children's habit by organizing the mealtimes with total calories that have been taken and encourage them to perform physical activities to burn the calories. Nowadays, there are several methods or techniques to influence the kids to brush teeth constantly and effectively. Technology can be used as influential tools to persuade the children. Persuasive technology are technologies allied with shifting an individual's behavioral through persuasion and social influence (Caraben et al. 2014). Technology indirectly encouraged the kids to change their habits towards better dental cares through tasty toothpaste and attractive design of colorful toothbrush (Puad et al. 2019).

According to Fogg (2011), persuasive technology (PT) can be defined as "technology that is designed to change attitudes or behavior of the users in a predetermined way". Besides motivation and persuasive, strategy is the most important element in the architecture of PT (Oinas-Kukkonen 2013; Oinas-Kukkonen & Harjumaa 2018). The persuasive technique or strategy to motivate behavioral changes should be considered carefully to design a system based on PT architecture (Chatterjee & Price 2009). The biggest challenges are to adapt the PT in the complex scenarios and based on the individual flexibility to maximize the overall effectiveness. There are several persuasive strategy variations which widely used with varieties of approaches such as Cialdini (2001) explained details 6 strategies, Fogg (2003) in his research elaborated about 40 strategies and 100 strategies introduced in other domain of PT research (Rhoads 2007). The research conducted by Nor Aziah et al. (2017), Persuasive System Design (PSD) designed by Oinas-Kukkonen & Harjumaa (2018) is the comprehensive framework to plan and evaluate the PT. Nevertheless, Nor Aziah et. al (2017) has found that most of the researchers in Malaysia did not apply the PSD as a reference or guidance to adapt the persuasive principles in the research. Hence, it is a must for the researchers to explore and scrutinize the PSD.

The Persuasive System Design (PSD) model has been suggested by Oinas-Kukkonen (2010), which four categories of design principles should be considered in the development of the prototype or application. The 4 principles are primary task, dialogue, system credibility and social support. The primary tasks focus on what are the primary tasks that should be carrying out. The second design principles relate to computer-human dialogue which helps to achieve the goals. The system credibility design principles relate on how to design a system so that it is more realistic and more persuasive. The design principles in the social support category describe on how to design the system so that it motivates

users by leveraging social influence. The following figure 1, shows the 4 design principles of PSD as suggested by Oinas-Kukkonen.

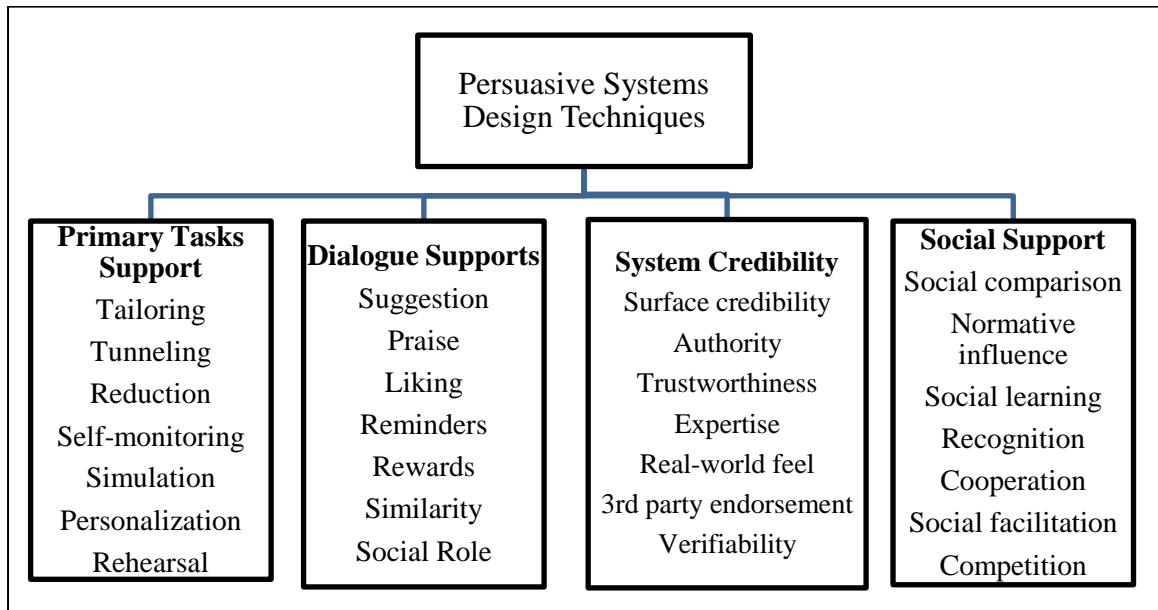


Figure 1: Persuasive Systems Design Techniques,
(adapted from by Oinas-Kukkonen(2010))

PSD is an architecture practices which focused on human behavioral influence through system characteristics on the motivation improvement, ability and human behavioral (Fogg 2009). In the context of this research, motivation elements to influence the childrens to brush their teeth in the situation or environment without enforcement from their parents have been indentified. 28 principles of PSD as explained by Oinas-Kukkonen & Harjumaa (2018), not all principles of PSD architecture will be adapted in this research domain. Therefore, with the underlying PSD, three persuasive principles personalization, liking and cooperation were adapted to encourage children (2-5 years) to brush their teeth in a fun way through.

Objective

Realizing the importance of hygiene and oral health care through tooth brushing activities, as well as the potential of PT in instilling motivation without coercion, this research aims:

- To encourage children (2-5 years) to brush their teeth in a fun way through the adaptation of the persuasive technology.
- To adapt three persuasive principles based on PSD, namely personalization, liking and cooperation to encourage children (2-5 years) to brush their teeth in a fun way.

Methodology

The methodology used is very simple, employing a do-it-yourself (DIY) approach with household items such as a toothbrush, various flavours of toothpaste, piping cake container and nozzles as shown in Figure 2. The use of items that are already available without having to work hard in their preparation, adapting the principle of cooperation where users (parents) are encouraged to cooperate naturally in changing their children's behaviour to brush teeth in a fun way.



Figure 2: DIY Persuasive Dental Product

Figure 3 shows the piping container and a variety of cake nozzles. Different nozzle patterns can be used depending on the child's interests and preferences. This scenario is related to the personalization principle. Personalized content or services have a greater persuasive ability on target users.



Figure 3: Piping Container and Cake Nozzles Set

Parents can fill toothpaste in the piping container, which has been modified and cut shorter to facilitate the process of filling toothpaste into it as shown in Figure 4. Parents can fill the different colours and flavours of toothpaste layer by layer based on their children's preferences. This activity is related to the liking principle. Using different colours of toothpaste creates a more appealing visual that is additionally persuasive with children's natural behaviour.

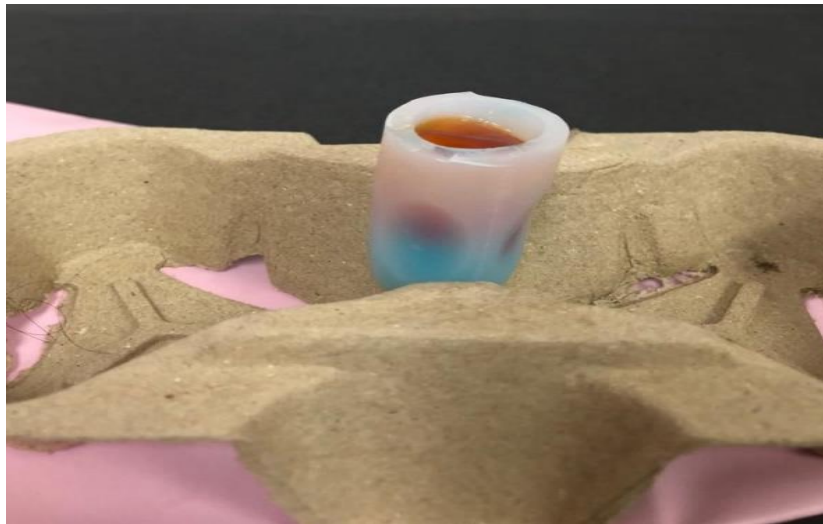


Figure 4: Piping Container with Toothpastes Layer

Figure 5 depicts the transformation of a piping container into a persuasive toothpaste container with variety of flavours and colours. The nozzle pattern can also be changed to entice children to use the toothpaste. This approach is closely related to the principles of personalization, liking, and cooperation.

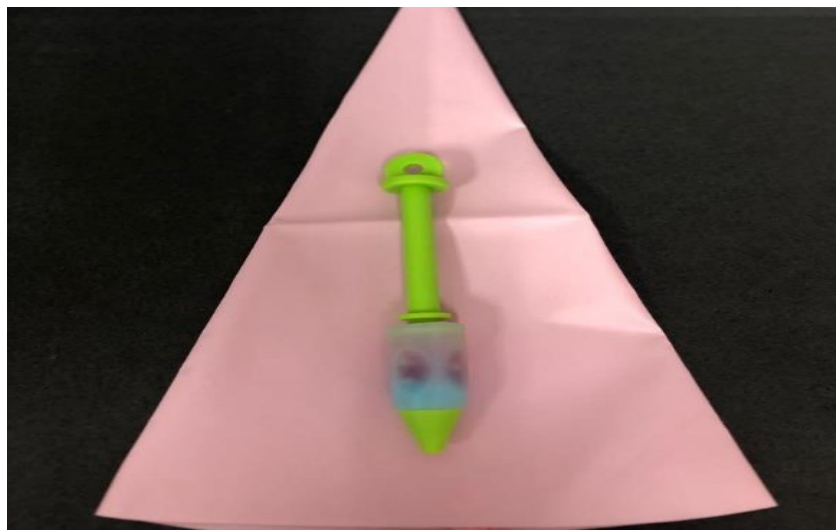


Figure 5: Persuasive Toothpaste Container

Figure 6 depicts a toothbrush containing toothpaste in a variety of colours and flavours. By using a persuasive toothpaste container, it is possible to get children excited about brushing their teeth every day. The nozzle patterns that can be changed on a daily basis to make tooth brushing more enjoyable. This is closely related to the personalization, liking, and cooperation principles.



Figure 6: Toothpaste in various colours and flavours

Figure 7 depicts how toothpaste colours and flavours can be combined to create a colour sensation as well as a variety of new flavours. It is up to the parents' creativity to make their children more interested in brushing their teeth in a fun way. This is closely related to the personalization, liking, and cooperation principles.



Figure 7: Toothpaste Colours and Flavours Blend

Conclusion

The effect of persuasive technology in the field of education is seen to be focused on increasing motivation through the adaptation of certain persuasive principles (Devincenzi et al. 2017). This study's solution idea assumes that motivated children who maintain oral hygiene by brushing their teeth in a fun way on a consistent basis can naturally form self-discipline. Furthermore, children's enthusiasm for customized toothpaste variants, colors, and flavorings becomes a motivating factor for these children to cooperate in brushing their teeth in a disciplined manner. Personalization, liking, and cooperation principles used in fun tooth brushing have a positive impact on developing children's discipline toward oral hygiene care habits.

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PERBANDINGAN KALKULATOR ZAKAT PENDAPATAN NEGERI PULAU PINANG, PAHANG DAN SELANGOR: KAJIAN ANALISA KANDUNGAN LAMAN WEB

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ABSTRAK

Kalkulator zakat pendapatan merupakan instrument yang diguna pakai oleh institusi pengurusan zakat negeri bagi menentukan samada seseorang individu layak membayar zakat atau tidak. Kalkulator ini dibangunkan berasaskan kepada atas talian bagi memudahkan pembayar zakat capai kepada kalkulator tersebut. Satu kajian analisa kandungan laman web telah dilakukan bagi membandingkan kalkulator pengiraan yang diguna pakai di Zakat Pulau Pinang (ZPP), Pusat Kutipan Zakat Pahang (PKZ Pahang) dan Lembaga Zakat Selangor (LZS). Antara perbandingan yang akan diambil kira ialah, item yang terdapat di bawah kategori pendapatan, jenis kategori dan item untuk tolakan, nilai tolakan mengikut item yang dibenarkan dan juga keunikan yang terdapat pada kalkulator zakat pendapatan.

Keywords: *kalkulator zakat, zakat pendapatan*

Pengenalan

Pusat kutipan zakat bagi setiap negeri mempunyai kalkulator zakat pendapatan yang tersendiri mengikut kepada takrifan masing-masing. Antara pusat zakat negeri yang menyediakan kalkulator pengiraan zakat Pendapatan ialah Zakat Pulau Pinang (ZPP), Pusat Kutipan Zakat Pahang (PKZ Pahang) dan Lembaga Zakat Selangor (LZS).

Tujuan kalkulator ini adalah untuk menyenangkan pembayar zakat di negeri tersebut menentukan sama ada mereka layak untuk membayar zakat pendapatan atau tidak. Jika layak, kalkulator ini juga akan memberi nilai bayaran zakat pendapatan yang perlu dibayar setiap bulan.

Oleh itu, satu kajian analisa kandungan laman web diadakan bagi membandingkan kalkulator yang digunakan pakai di ZPP, PKZ Pahang dan LZS memandangkan kalkulator zakat Pendapatan boleh dicapai melalui laman web masing-masing.

Objektif kajian adalah seperti berikut:

- i. Menentukan item pendapatan yang diambil kira
- ii. Menentukan kategori, item dan nilai bagi tolakan
- iii. Mengenalpasti keunikan pada kalkulator pengiraan zakat pendapatan

Kajian Kesusasteraan

Zakat

Perkataan zakat atau *al-Zakah* dalam bahasa Arab mengandungi pelbagai maksud. Zakat bermaksud suci, rahmat, berkembang, subur, pintar, bertambah, baik, damai, sedekah dan terpuji. Akan tetapi, makna yang sering digunakan bagi perkataan ini lebih merujuk kepada pengeluaran sejumlah harta tertentu. Zakat dari istilah syarak pula ialah hak yang wajib dikeluarkan daripada harta. Menurut mazhab Maliki, zakat didefinisikan sebagai 'mengeluarkan sebahagian daripada harta yang khusus yang telah mencapai had kuantiti yang mewajibkan zakat kepada orang yang berhak menerimanya (mustahiq) dengan syarat pemilikan itu penuh dan mencapai haul (setahun), bukan tambang dan bukan pertanian. Para fukaha mazhab Hanafi mendefinisikan zakat sebagai menjadikan sebahagian harta yang khusus daripada harta yang khusus sebagai milik orang yang khusus, yang ditentukan oleh syarak kerana Allah S.W.T." Ungkapan "menjadikan sebahagian harta ... sebagai milik" (tamlik) dalam definisi di atas bermaksud untuk penghindaran daripada ibahah (kezinaan). Dengan demikian, seandainya seseorang memberi makan kepada seorang anak yatim dengan niat mengeluarkan zakat, maka zakat dengan cara tersebut dianggap tidak sah. Demikian juga jika makanan itu diserahkan kepada anak yatim tersebut atau memberi pakaian kepadanya walaupun syarat pemilikan harta itu dikaitkan kepadanya iaitu orang yang menerimanya. Harta yang diberikan itu hanya dihukum sebagai nafkah kepada anak yatim tersebut kerana syarat-syarat sebagai zakat tidak lengkap. Dalam mazhab Syafi'e, zakat didefinisikan sebagai satu ungkapan untuk pengeluaran harta tertentu secara wajib dan diagihkan kepada golongan tertentu apabila cukup syarat-syarat wajibnya. Mazhab Hanbali pula mendefinisikan zakat sebagai hak yang wajib dikeluarkan daripada harta yang khusus untuk kelompok yang khusus juga (Mohd Uda Kasim (2004).

Terdapat tiga makna zakat yang berbeza daripada segi linguistik, teologi atau undang-undang. Sudut linguistiknya, zakat bermakna pembersihan atau penyucian sesuatu dari kotoran dan najis. Seterusnya dari segi teologi pula ialah zakat membawa penyucian rohani iaitu cara terhasilnya memberi zakat dan terakhirnya dari sudut undang-undangnya adalah zakat bermaksud pemberian pemilikan harta khusus untuk khusus kepada individu tertentu di bawah keadaan tertentu (Siti Norhidayah & Hairunnizam , 2017).

Selain itu, zakat berperanan sebagai mekanisme kewangan yang berfungsi sebagai satu bentuk jaminan keselamatan sosial bagi mereka yang berada dalam kemiskinan dan memerlukan. Di samping itu, ia juga berperanan dalam menjana pertumbuhan ekonomi yang seimbang melalui agihan semula kekayaan dan masyarakat (Nur Alisha & Hairunnizam, 2018).

Zakat pendapatan

Zakat gaji dalam sistem pengurusan kewangan Islam dikenal sebagai *ata'* ('*utiyat*), iaitu apa-apa upah yang diterima oleh seseorang dari pada majikan sebagai balasan perkhidmatan (kerja) yang dibenarkan oleh syarak. Manakala zakat pendapatan dikenal dengan istilah *al-Mal al-Mustafad* yang bermaksud apa-apa ganjaran yang diterima oleh seseorang daripada mana-mana pihak sebagai hasil kepakaran (kerja) yang dibenarkan oleh syarak. Sejak akhir-akhir ini, kedua-dua bentuk zakat di atas mengguna pakai istilah *al-Mal al-Mustafad* yang bermaksud "apa-apa upahan, ganjaran, habuan atau mana-mana sebutan yang semakna dengan pendapatan daripada majikan awam atau swasta mahupun pelanggan secara tetap, kontrak, persaraan atau kematian dengan syarat pendapatan itu terkeluar dari pada transaksi perniagaan, pelaburan atau pembiakan ternakan." Zakat *al-Mal al-Mustafad* merupakan satu sumber zakat baru yang diperkenalkan secara meluas oleh Prof. Dr. Yusuf al-Qaradawi melalui buku beliau yang bertajuk *Fiqh al-Zakat Dirāsah Mugaranah li-Ahkamihā wa Falsafatihā fi Daw' al-Qur'an wa al-Sunnah* (Mujaini Tarimin, 2006).

Zakat pendapatan merupakan antara topik perbincangan yang hangat pada masa kini. Harta perolehan terbahagi kepada tiga.

1. Harta pendapatan, gaji, dan upah

Segala pendapatan yang diperoleh seseorang daripada majikannya hasil daripada usaha atau pekerjaan yang dilakukan untuk majikannya sama ada semasa berkhidmat, selepas berkhidmat atau selepas kematiannya (pencen terbitan). Maksud pendapatan di sini boleh dirujuk kepada pendapatan bulanan atau upah tertentu (Shofian & Amir Husin, 2002). Contohnya gaji, upah, bonus, pencen, insentif, gratuiti dan lain-lain.

2. Harta hasil pekerjaan bebas

Segala pendapatan yang diperoleh seseorang hasil daripada pekerjaan yang dilakukan atas usaha sendiri tanpa ada kaitan dengan pihak lain dalam bentuk kerja bebas atau perkhidmatan professional. Contohnya doktor, peguam, kontraktor, hasil komisen, arkitek dan royalti hakcipta serta lain-lain.

3. Harta hasil aset tetap

Harta yang tetap induknya tetapi boleh berkembang dengan mendatangkan pendapatan melalui sewaan atau jualan hasilnya. Contohnya hasil sewaan rumah atau kenderaan, hasil ladang getah, sawit, pertanian selain padi, hasil ternakan seperti telur, susu dan lain-lain.

Berdasarkan penelitian, terdapat beberapa kajian yang ditemui berkenaan dengan kalkulator zakat. Antaranya ialah kajian berkenaan aplikasi konsep khultah dalam pengiraan zakat di Malaysia yang merangkumi cabaran dan penyelesaiannya. Khultah secara umumnya merujuk kepada harta-harta yang dimiliki oleh beberapa pemilik yang dihimpunkan sehingga mencukupkan kadar nisab zakat. Khultah juga bermaksud Khultah bermaksud aset-aset yang dimiliki oleh beberapa orang pemilik yang disimpan di tempat yang sama, dan segala pengurusan berkaitan dengannya diuruskan oleh satu pihak yang telah dilantik oleh pemilik-pemilik harta tersebut. Antara isu yang dikemukakan ialah khultah diamalkan di Tabung Haji dan syarikat perniagaan sahaja. Terdapat ketidakseragaman terutama bagi zakat ke atas akaun-akaun simpanan di bank-bank, dana-dana dan instrumen pelaburan semasa. Seterusnya isu berkenaan mencampurkan harta dari beberapa akaun untuk mencukupkan kadar zakat. Selain itu antara halangannya ialah wujud akaun berbeza dalam tempoh waktu ia dibuka disamping jualan di samping jumlah simpanan semasa ia dibuka tidak mencapai nişāb . Cara pembayaran tidak jelas dan pemilik akaun tidak tertakluk kepada zakat juga menjadi halangan dalam mengimplementasikan kiraan zakat berdasarkan khultah (Ahmad Zikrullah & Ridzwan Ahmad, 2017).

Selain itu, terdapat kajian berkenaan sorotan Perbezaan had kifayah perbelanjaan keperluan asasi dan kesannya dalam pengiraan zakat pendapatan. Kajian ini telah menganalisis perbezaan jumlah bayaran zakat pendapatan individu berdasarkan had perbelanjaan keperluan asasi hidup yang ditetapkan dalam pengiraan zakat pendapatan. Pengiraan zakat pendapatan dengan andaian pendapatan dan perbelanjaan secara simulasi melalui kalkulator zakat atas talian dilaksanakan. Dapatan kajian ini mendapati perbelanjaan keperluan asas menunjukkan wujud persamaan dan perbezaan berkaitan jenis dan kadar digunakan. Dapatan daripada kajian ini menunjukkan bahawa perbezaan jenis PKA khususnya antara negeri memerlukan penilaian semula (Fidlizan Muhammmad et. al).

Seterusnya kajian Nur Afiqah Mat Tajudin et. Al (2021) adalah berkenaan tahap pengetahuan berkaitan item-item dalam pengiraan jumlah pendapatan berzakat dalam kalangan penjawat awam di negeri Perak. Terdapat empat item pendapatan yang dikaji iaitu melibatkan gaji dan elaun tetap bulanan, tunggakan gaji dan bonus. Dapatan kajian mendapati tahap pengetahuan responden berkaitan konsep asas zakat secara umum dan khusus adalah sangat tinggi. Namun analisis item mendapati item tunggakan gaji dan bonus berada pada tahap kurang diketahui oleh penjawat awam di Perak.

Latar belakang Zakat Pulau Pinang

Zakat Pulau Pinang secara rasminya memulakan operasi pada 27 Disember 1994 yang berpusat di Taman Selat, Butterworth. Pada awal penubuhannya terdapat dua lagi cawangan kaunter perkhidmatan zakat iaitu di Jabatan Agama Islam Pulau Pinang (JAIPP) dan di kompleks Bukit Mertajam. Pada 3 Januari 2005, Zakat Pulau Pinang berjaya memiliki bangunan sendiri di Bandar Perda, Bukit Mertajam di samping mempunyai enam cawangan perkhidmatan zakat di Nibong Tebal, Bayan Baru, Balik Pulau, Kepala Batas, Lebuh Buckingham dan Ayer Itam. Objektif utama penubuhan ZPP antara adalah meningkatkan kutipan zakat negeri Pulau Pinang, memperkenalkan sistem pungutan zakat yang lebih sistematik melalui operasi berkomputer dan menyediakan kemudahan membayar dan mengagihkan wang zakat dengan lebih berkesan dan adil agar pembayar zakat dan umat Islam tidak dizalimi seterusnya menambahkan keyakinan kepada institusi zakat (Zakat Pulau Pinang, t.t) .

Latar belakang Pusat Kutipan Zakat Pahang

Pusat Kutipan Zakat Pahang ditubuhkan pada 16 September 1995 dan beroperasi secara rasmi pada 2 Januari 1996 dan ketika itu terdapat 9 orang kakitangan. Objektif penubuhan PKZ adalah untuk meningkatkan kutipan zakat di negeri Pahang yang bermula sejak tahun 1983 oleh Majlis Ugama Islam Dan Adat Resam Melayu Pahang (MUIP) dan Jabatan Agama Islam Pahang (JAIP). Pada awalnya MUIP telah melantik sebuah badan swasta iaitu Azzakah Sdn Bhd (AZSB) untuk menguruskan kutipan zakat negeri. Tahun 2000 menyaksikan MUIP mengambil alih PKZ Pahang sepenuhnya sehingga sekarang. Selain itu, antara objektif penubuhannya juga adalah memberi penerangan dan maklumat berkenaan zakat harta secara berkesan dengan menggunakan kaedah terkini. Seterusnya menawarkan pelbagai kemudahan dalam pembayaran zakat di samping mengadakan kajian dan pembangunan dalam urusan zakat harta di negeri Pahang Darul Makmur (Pusat Kutipan Zakat Pahang, t.t).

Latar belakang Lembaga Zakat Selangor

Lembaga Zakat Selangor berada di bawah Majlis Agama Islam Selangor (MAIS). Ia telah ditubuhkan 20 tahun lalu. Sepanjang tempoh dua dekad penubuhannya, LZS berjaya meningkatkan momentum kecemerlangannya sebagai institusi zakat yang disegani dengan konsisten mempergiatkan gerak kerja dakwah untuk memastikan masyarakat mendapat pendedahan untuk menunaikan rukun Islam ini. Pengagihan zakat juga ditambah baik secara menyeluruh dan berkesan kepada lapan asnaf, Ini termasuklah melibatkan lima program pembangunan utama asnaf iaitu program pembangunan sosial, ekonomi, insan, pendidikan dan pembangunan institusi agama. Melalui motto 'Meneraju Perubahan', LZS (MAIS) sentiasa berusaha menawarkan perkhidmatan terbaik kepada para pelanggannya sama ada melibatkan pembayar dan penerima zakat. Ketika ini dengan tenaga kerja melebihi 400 orang staf dan

mempunyai 25 cawangan seluruh seluruh Selangor, LZS konsisten menjalankan amanah sebagai amil dan amiin yang mempunyai integriti integriti, jujur dan telus dalam melaksanakan tanggungjawabnya (Lembaga Zakat Selangor, t.t).

Metodologi Kajian

Kajian ini menggunakan metodologi kajian kandungan atas talian dengan melayari laman web pusat zakat negeri dan memfokus kepada kalkulator zakat pendapatan. Setiap kategori dan item yang diguna pakai oleh setiap kalkulator akan dikenal pasti dan akan membuat perbandingan. Selain itu, keunikan setiap kalkulator juga akan dikenal pasti. Kalkulator yang dipilih untuk dibuat perbandingan ialah Zakat Pulau Pinang, Kutipan Zakat Pahang dan Lembaga Zakat Selangor.

Hasil Kajian

Hasil kajian untuk kategori pendapatan adalah seperti ditunjukkan dalam jadual 1.

Jadual 1: Item yang terdapat di Kategori Pendapatan

Item	ZPP	PKZ Pahang	LZS
Pendapatan Penggajian	/	/	/
Pendapatan dari Elaun	/	/	/
Pendapatan dari Elaun Lebih Masa	/	/	/
Pendapatan Hasil Bebas / Profesional	X	/	/
Pendapatan Hasil Aset Tetap	X	/	/
Pendapatan Hasil Pemberian atau Sumbangan	X	X	/

Bagi tolakan ia boleh di pecahkan kepada tolakan had kifayah isi rumah (Jadual 2) dan had kifayah bersyarat/tambahan (Jadual 3). Hasil kajian adalah seperti berikut:

Jadual 2: Tolakan – Had Kifayah Isi Rumah

Item	ZPP	PKZ Pahang	LZS
Diri Sendiri / Ketua Keluarga	9000	14400	12936
Pasangan Tidak Bekerja (per individu)	3000	3000	X
Pasangan Bekerja (per individu)	3000	3000	X
Bilangan Anak (per individu)	1000	X	X
Dewasa Bekerja 18 tahun ke atas (per individu)	X	X	4848

*LZS – termasuk isteri

Dewasa Tidak Bekerja 18 tahun ke atas (per individu)	X	X	2172
*LZS – termasuk isteri			
Anak IPT (per individu)	X	4200	7104
Anak 7 tahun ke atas (per individu)	X	2400	4008
Anak 6 tahun ke bawah (per individu)	X	3600	1740

Jadual 3: Tolakan – Had Kifayah Bersyarat/Tambahan

Item	ZPP	PKZ Pahang	LZS
Nafkah untuk Ibu Bapa	/	Terhad 4200	X
Potongan KWSP	/	/	11%
Caruman Tabung Haji	/	/	/
Penjagaan Kesihatan Sakit Kronik (Isi Rumah dan Selain isi Rumah)	X	Terhad 2400	2664
Anak OKU	X	X	2668
Kos Penjagaan Anak (Nursery)	X	X	3480

Hasil kajian mengenai keunikan kalkulator seperti di senaraikan di jadual 4.

Jadual 4: Keunikan Kalkulator

Intitusti	Keunikan
ZPP	Mudah dan ringkas Jumlah tolakan berasaskan kepada jumlah Lembaga Hasil Dalam Negeri.
PKZ Pahang	Suami dan isteri boleh menentukan jumlah bilangan anak mengikut diri masing-masing. Jumlah tolakan berasaskan kepada penyelidikan had kifayah muzzaki.
LZS	Kos penjagaan anak di nursery di ambil kira. Anak OKU Jumlah tolakan berasaskan kepada penyelidikan had kifayah asnaf.

Kesimpulan

Kesimpulan daripada perbandingan mendapati, kategori untuk pengiraan zakat pendapatan adalah berlainan mengikut negeri. Jumlah yang diberi tolakan juga berbeza. Dari segi kategori pendapatan, LZS mempunyai item pendapatan yang lebih banyak berbanding dengan ZPP dan PKZ Pahang. Bagi bahagian tolakan, di ZPP nilai tolakan untuk setiap kategori adalah berasaskan kepada LHDN, manakala, PKZ Pahang pula berasaskan kepada penyelidikan had kifayah muzzaki dan LZS berasaskan kepada had kifayah asnaf.

LZS juga mengambil kira penjagaan anak OKU dan penjagaan anak di rumah pengasuh yang tidak terdapat di ZPP dan PKZ Pahang. LZS juga meletakkan kategori pasangan di dalam kategori dewasa 18 tahun bekerja dan dewasa 18 tahun tidak bekerja. ZPP pula hanya mempunyai 1 kategori anak manakala PKZ Pahang dan LZS mengkategorikan anak kepada 3 kategori iaitu, Anak IPT, Anak 7 tahun ke atas dan anak 6 tahun dan ke bawah.

Cadangan masa hadapan ialah supaya setiap negeri mempunyai kalkulator zakat yang sama supaya dapat memudahkan pengiraan zakat pendapatan walaupun nilai tolakan yang berlainan kerana ia mengikut kos kehidupan setempat. Inisiatif ini dapat membantu menyeragamkan kategori dan item bagi pendapatan dan tolakan.

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STUDENTS' ACADEMIC PERFORMANCE APPLICATION GUIDELINE

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ABSTRACT

Every educational institution has educators who participate in the recording of assessment results for students. This is to make sure that educators can continue to be held accountable for the confidential results of their students. Academic performance indicators, such as marks and grades, offer details about students' development and help educators to decide what kind of instruction their students will require. This study developed the Students' Academic Performance Application to track assessment outcomes simply for students. Hence, to construct this system, data studio application software was employed. Additionally, it can make it easy for educators to monitor students' growth and progress, as well as any weak areas. A great technique to precisely track each student's improvement is to create a special folder for them. Each folder can be used to store documents that serve as evidence of the students' academic achievement.

Keyword: *students' performance, academic application, data studio*

Introduction

The word "assessment" is frequently used in a variety of contexts and has various connotations for various people. Most students associate assessment with testing and grading, which involves determining quiz and exam scores and determining course grades. Educators frequently use assessment to inform students of their progress or performance in a course. An emerging idea of assessment is that it is a dynamic process that continuously produces data about how well students are doing in reaching their learning objectives (Garfield, 1994).

Some educators assign letter grades, while others assign numerical values, frequently the test's accuracy percentage. Afterwards, using either approach, the grades are averaged; frequently using a weighting procedure intended to give some grades a higher weight than others. Discussion of the advantages of various strategies typically focuses on the issue of whether averaging letter or numerical grades is preferable or regarding a specific aspect of the weighting process (Cross, 1994).

In addition, the study by Beguin & Wood (2015) found that assessment results are usually reported in terms of grades or marks. When properly understood and applied, the assessment results can be used to set educationally significant performance goals for the future. Educators can agree on their priorities, concentrating, for example, on specific curriculum domains in a coherent manner or on

student populations who are at risk. They can effectively set concrete, attainable goals for growth and track their progress toward those goals. The educational institutions themselves are in charge of and in control of their own development with this kind of evaluation. The robustness of evaluation and improvement systems may come into focus in the inspection and accountability frameworks over time, and there may be significant engagement.

Finally, since the nation has now entered an endemic phase, blended learning is still used for teaching and learning in higher education institutions. So many different techniques are used to make the teaching and learning process easier. Apart from that, a more systematic method of recording student evaluation scores is also very important to make the teaching and learning process run smoothly. A record system is defined as the system in which an organization's information is captured in its entirety. It is considered an important tool for organizational accountability, compliance with legislative requirements, and the development of corporate memory (Assaf et al., 2022). Since the invention of computers, students can now receive updates on their progress and feedback, limited only to the level of efficiency.

Therefore, students' academic performance applications have been created using Data Studio to track student evaluation results that can be available at anytime and anywhere. The aim of this project is to create an online application in which students can view their evaluation coursework and download answer scripts that have been checked by the educator.

A Brief Overview

The students' academic performance application was developed to monitor student evaluation outcomes. This application has several interesting features and makes it easy for students to track their assessment scores immediately after an assessment is conducted. Figure 1 below shows the interface of this application that can be access thru the link given by educators.

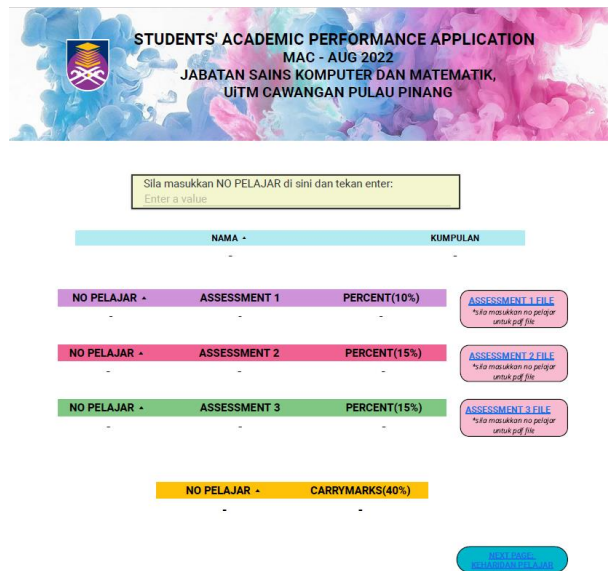


Figure 1: The students' academic performance application interface

Students need to enter their respective ID numbers to check their marks along with the files that have been uploaded by the educators as shown in Figure 2 below. The student's score will be displayed on the screen.

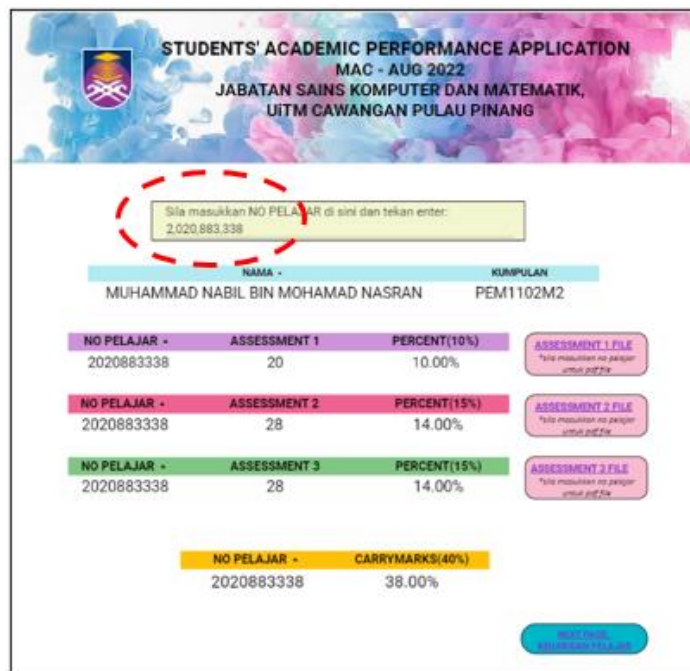


Figure 2: Insert student 's ID number

Figure 3 shows that the assessment file button that students need to click the to view the file that has been marked by the educators in Google Drive.

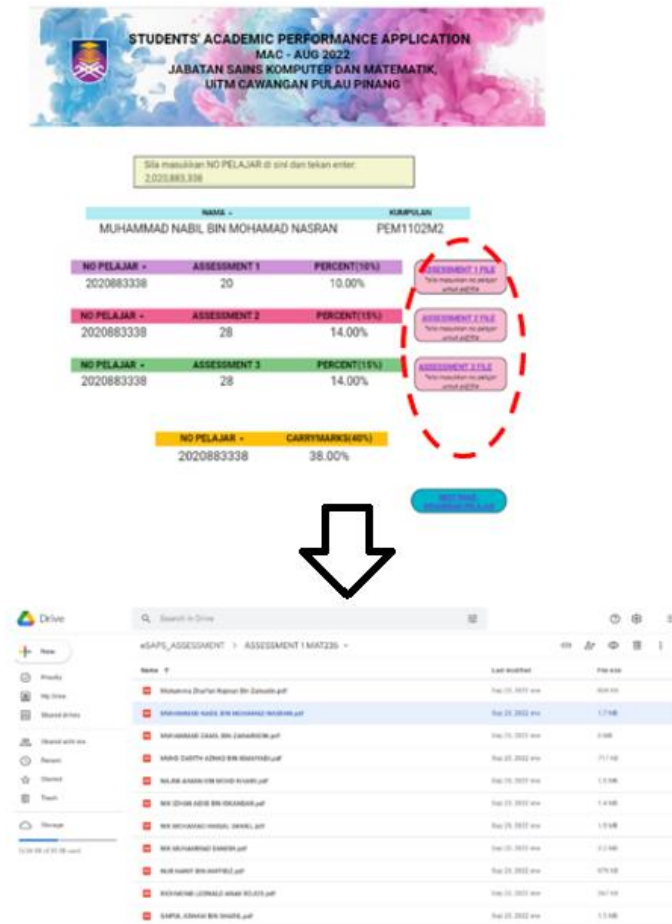


Figure 3: Click to view assessment file

Since all student files are confidential, they need to enter their student number to view their respective files as shown in Figure 4 below.

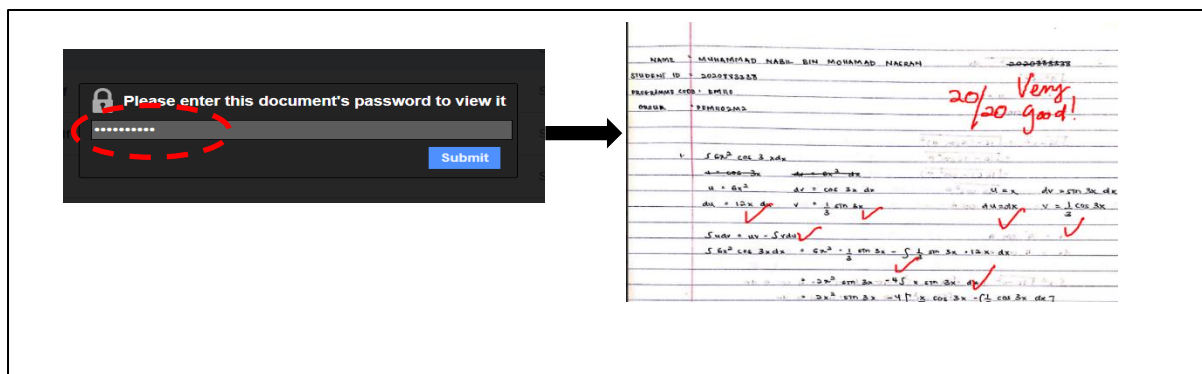


Figure 4: Enter student's ID number

Finally, this application also shows student attendance during the assessment. As a result, the record can be used as evidence of attendance by both students and educators.

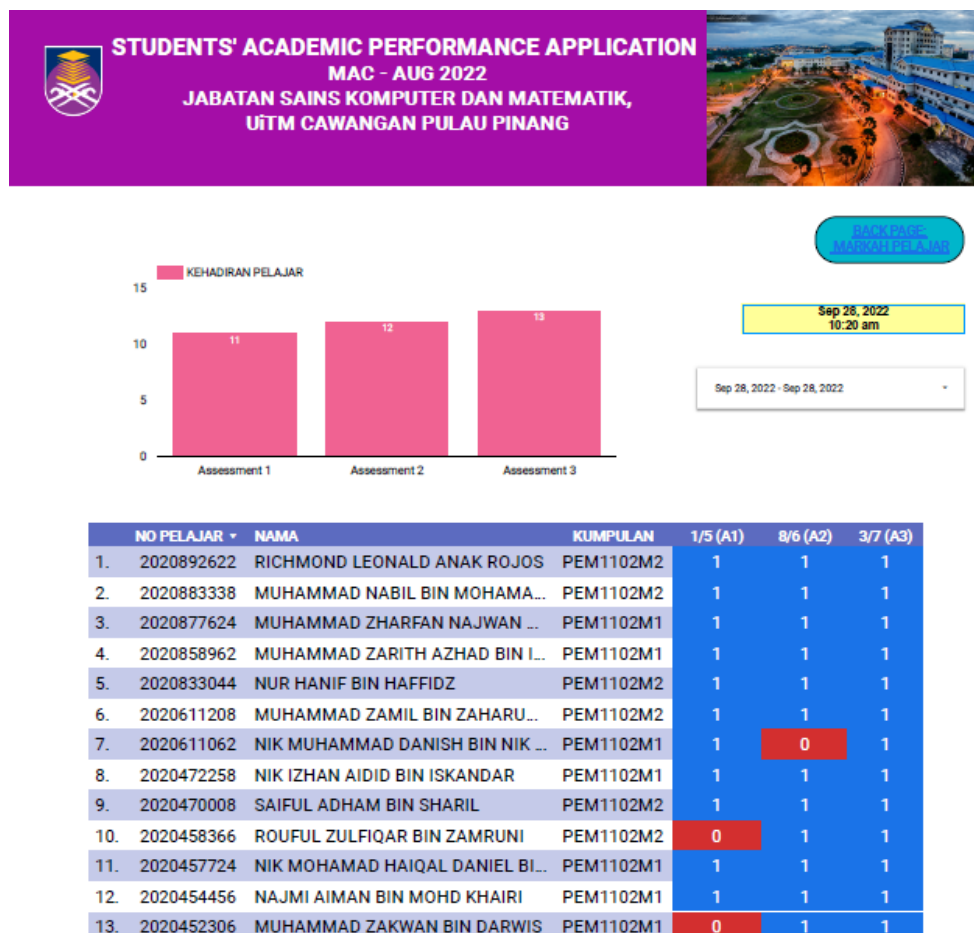


Figure 5: Students' attendance list

Conclusion

The students' academic performance application was developed to record and store student assessment data, especially in higher education institutions. This is one of the practical applications for students as technology advances in online teaching and learning. In general, this application has fulfilled its development objective of changing traditional methods to online applications. It is one of the innovative activities in the world of education where students can view their evaluation coursework and download their answer scripts that the educator has checked. For future improvement, the students' academic performance application can add a proof of absence function to the student attendance list section throughout the semester.

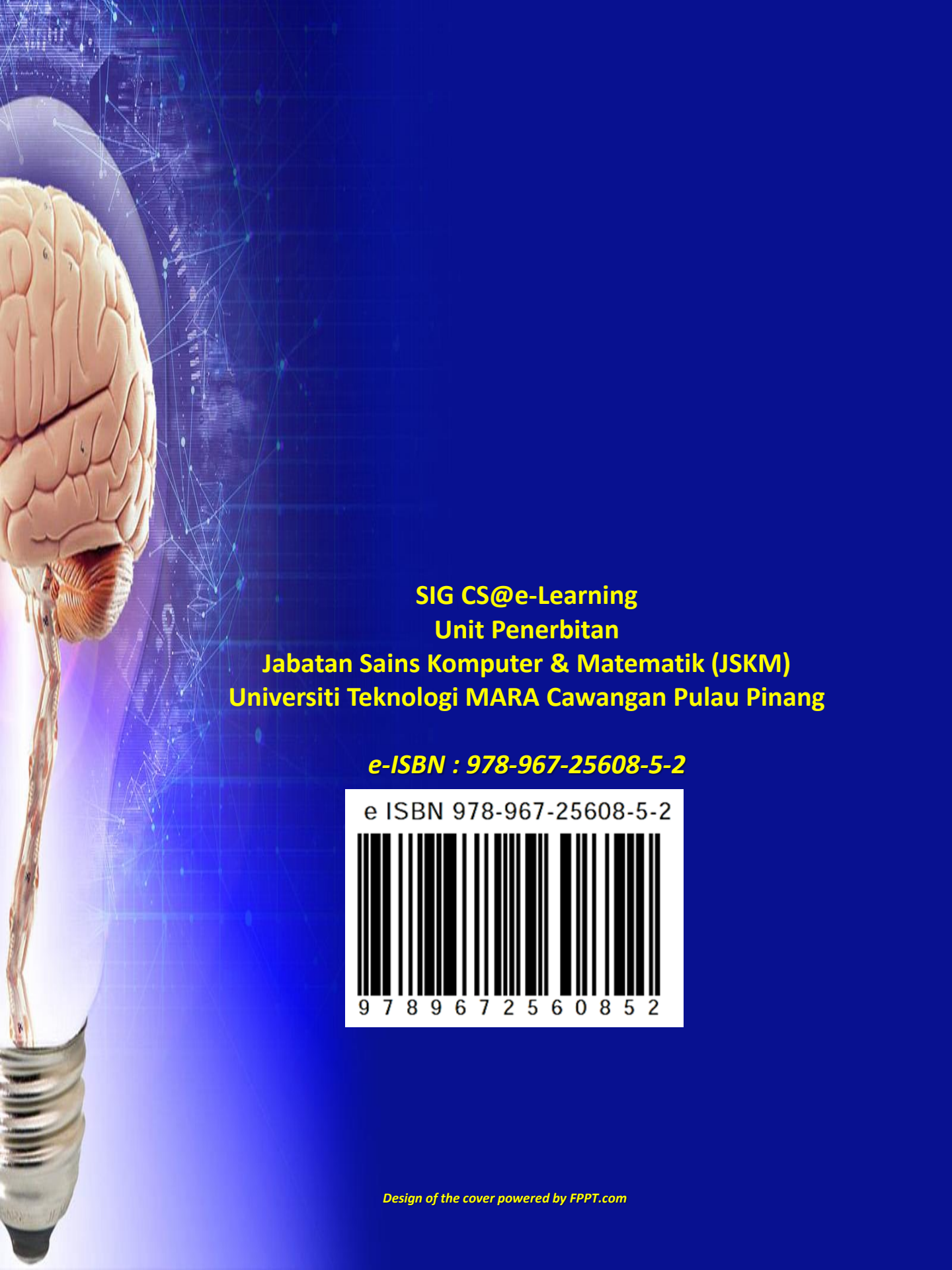
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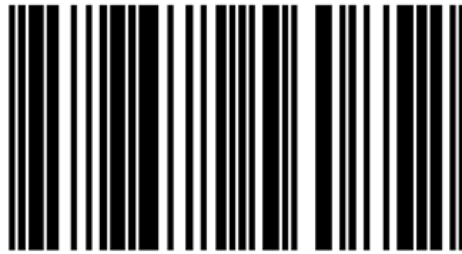
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