NAVIGATING THE SPECTRUM: THE NEW WAVE OF e-LEARNING INNOVATIONS

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Universiti Teknologi MARA Cawangan Pulau Pinang

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PREFACE

The SIG CS@e-Learning committee expresses its deep appreciation to the Divine for the invaluable contributions of educators from Kolej Pengajian Pengkomputeran, Informatik dan Media (KPPIM), UiTM Penang Branch, in the creation of the sixth edition. A total of 17 scholarly articles were submitted to the committee, all of which were accepted. These submissions exhibited sufficient content and research frameworks. Authors are encouraged to enhance their papers by incorporating additional findings and discussions for potential publication in SCOPUS, WOS, or ERA indexed journals.

The central theme of the seventh volume focuses on the Navigating The Spectrum: The New Wave Of E-Learning Innovations. Over recent decades, e-learning has emerged as a crucial mode of learning and instruction, proving to be both efficient and effective. The significant increase in global Internet users equipped with smartphones and tablets has greatly facilitated the dissemination of e-learning, covering not only higher education and vocational training but also primary and secondary education. Emerging trends in e-learning include various areas such as artificial intelligence (AI), micro-credentials, big data, virtual and augmented reality, blended learning, cloud-based e-learning, gamification, mobile learning, the Internet of Things (IoT), and online video.

The SIG CS@e-Learning is dedicated to continuous and active involvement in publishing academically impactful articles. It is our hope that KPPIM achieves notable levels of publication in high-impact journals, with the blessings of the Almighty.

Ts. Jamal Othman
Chief Editor
SIG CS@e-LEARNING
NAVIGATING THE SPECTRUM: THE NEW WAVE OF e-LEARNING INNOVATIONS
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TABLE OF CONTENTS

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ANALISA PERBELANJAAN MAKANAN, PERLINDUNGAN DAN PENGANGKUTAN BAGI PENDUDUK BUJANG DI NEGERI PULAU PINANG

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ABSTRAK

Satu kajian telah dilakukan untuk analisa perbelanjaan penduduk bujang beragama Islam di negeri Pulau Pinang. Kajian ini dilakukan bertujuan mengenalpasti kos perbelanjaan meliputi makanan, perlindungan dan pengangkutan kerana ia merupakan perbelanjaan yang dominan. Metodologi kajian berasaskan kepada soal selidik yang diedarkan kepada oleh enumerator bagi memastikan responden kajian adalah bujang dan beragama Islam. Hasil kajian mengkategorikan perbelanjaan mengikut julat umur responden. Hasil kajian juga dapat membantu pihak berkuasa untuk dapatkan gambaran sebenar perbelanjaan penduduk bujang Islam di Pulau Pinang.

Keywords: bujang, perbelanjaan, Pulau Pinang

Pengenalan

Kajian analisa perbelanjaan penduduk bujang Islam di negeri Pulau Pinang bertujuan untuk mendapatkan gambaran sebenar perbelanjaan yang dibelanja oleh golongan ini. Hasil kajian ini dapat membantu pihak berkuasa untuk menyelaras semula atau semakan semula kadar bantuan.

Objektif kajian adalah seperti berikut:

i. Mengenalpasti jumlah perbelanjaan makanan
ii. Mengenalpasti jumlah perbelanjaan perlindungan meliputi bil utiliti
iii. Mengenalpasti jumlah perbelanjaan pengangkutan

Jumlah perbelanjaan yang didapati adalah jumlah perbelanjaan bulanan.

Sorotan Kajian

Setakat penelitian pengkaji berkenaan sorotan kajian yang dilakukan, terdapat beberapa kajian terdahulu yang berkaitan dengan objektif kajian ini. Hubungan antara teori kajian-kajian terdahulu dijadikan rujukan untuk diisi oleh kajian ini.

Kajian yang dilakukan Norshuhada Bukhari dan Norizan Rameli (2021) telah menganalisis perbelanjaan belia kumpulan B40 serta M40 yang menetap di bandar berdasarkan keperluan tertentu. Ia memberikan gambaran yang komprehensif mengenai perbelanjaan belia kumpulan B40 dan M40 yang menetap di bandar. Dapatan kajian ini memberikan beberapa yang melibatkan beberapa kepentingan keperluan utama. Ini termasuklah dalam menghadapi cabaran kehidupan bandar, belia B40 dan M40 memberikan keutamaan kepada keperluan penting seperti perlindungan, kesihatan, dan keperluan-keperluan asas. Selain itu kajian mencatatkan bahawa walaupun tempat tinggal merupakan keperluan asas, kos sara hidup yang tinggi di bandar menyebabkan banyak belia memilih untuk menyewa berbanding membeli rumah. Perbelanjaan belia juga dipengaruhi oleh pendapatan yang terhad, dan keperluan seperti perlindungan dan kesihatan dapat dipertingkat dengan adanya lebihan wang hasil kos perbelanjaan bagi tujuan perumahan yang lebih rendah. Kajian ini juga menyatakan bahawa kesibukan mencari wang dapat menyebabkan kurangnya penekanan terhadap keperluan masa lapang walaupun kehidupan bandar menawarkan pelbagai bentuk hiburan. Secara tidak langsung menggambarkan tahap survival yang tinggi bagi belia kumpulan B40 dan M40 di bandar. Walaupun belia mempunyai pendapatan terhad, amalan nilai-nilai kekeluargaan masih diutamakan, dan golongan belia ini terus berbakti kepada keluarga.

Selain itu, kajian Nur Jannah Bukhari et al. (2021) memberikan fokus kepada analisis perbelanjaan belia kumpulan B40 dan M40 di Kuala Lumpur dengan penekanan pada keperluan tertentu seperti keperluan asas, perlindungan dan kesihatan, keluarga, agama, dan masa lapang. Kajian mendapati bahawa tiada perbezaan yang signifikan antara perbelanjaan belia kumpulan B40 dan M40 di Kuala Lumpur. Ini mungkin menunjukkan adanya kesamaan dalam gaya hidup dan keperluan di antara kedua kumpulan tersebut. Walau bagaimanapun, terdapat perbezaan keutamaan ketika berbelanja, yang dipacu oleh keinginan untuk menjamin kelangsungan hidup di bandar. Ini menunjukkan bahawa faktor-faktor seperti harga rumah yang tinggi di bandar dapat mempengaruhi keputusan perbelanjaan bagi keperluan perumahan. Di samping itu, walaupun pemilikan rumah sering menjadi perbincangan utama dalam kajian perbelanjaan, kajian ini menyatakan bahawa perbelanjaan bagi keperluan perumahan, terutamanya untuk membeli rumah, bukanlah penyumbang utama dalam keseluruhan perbelanjaan. Rumusannya, kajian ini memberikan pandangan yang jelas mengenai perbelanjaan belia kumpulan B40 dan M40 di Kuala Lumpur, dengan mengidentifikasi keutamaan-

keutamaan yang mempengaruhi pola perbelanjaan mereka, terutamanya dalam konteks kehidupan bandar yang mencabar.

Seterusnya, menurut Nik Fakrulhazri dan Azemi Che Hamid (2016) keseluruhan purata pendapatan belia di Pantai Timur menunjukkan purata perbelanjaan golongan itu secara keseluruhannya lebih tinggi berbanding dengan pendapatan. Selain itu, keseluruhan perbelanjaan belia di Pantai Timur memberi tumpuan utama kepada urusan pembelian makanan, diikuti dengan perbelanjaan melibatkan pendidikan, ketiga pengangkutan, diikuti dengan pakaian dan pembayaran bil telefon. Berdasarkan analisis korelasi menunjukkan wujud hubungan signifikan yang positif antara jumlah pendapatan dengan skor kualiti hidup belia di Pantai Timur. Berdasarkan kepada isu ini, pengkaji telah menyarankan agar kelompok belia harus mempelbagaikan sumber pendapatan selain daripada melibatkan diri dengan aktiviti perniagaan dan menjadi usahawan muda dalam meningkatkan pendapatan utama dan sampingan.

Kajian yang dilakukan oleh Nooriah Yusof dan Zakiyah Jamaluddin (2018) telah membincangkan persepsi penghuni di perumahan kos rendah dan sederhana dalam bandar di Pulau Pinang terhadap kemampuan menanggung kos perbelanjaan perumahan pada masa kini dan masa hadapan serta kesannya terhadap kesejahteraan hidup mereka. Hasil kajian mendapati majoriti responden memperuntukkan lebih daripada 30 peratus daripada pendapatan mereka untuk kos perbelanjaan perumahan dan mengangap ianya adalah membebankan. Malahan terdapat segelintir responden yang tidak dapat membuat bayaran tepat pada masanya dan kesannya mmereka terpaksa mengawal perbelanjaan, mendapatkan pinjaman daripada pihak lain atau melakukan pekerjaan tambahan bagi meneruskan kelangsungan hidup. Impak berlakunya fenomena sosial sebenarnya boleh memberi kesan terhadap kualiti hidup masyarakat. Penduduk berpendapatan rendah dan sederhana ternyata menerima kesan ketara apabila kos perbelanjaan perumahan menjadi semakin mahal dan membebankan.

Kajian oleh Wijaya Kamal Ramlan et al. (2018) menyoroti aspek-aspek penting berkaitan corak perbelanjaan dan kemampuan berbelanja golongan belia di Malaysia. Corak perbelanjaan belia memberikan tumpuan kepada jenis-jenis perbelanjaan yang menjadi fokus kajian. Pemaparan tentang jenis perbelanjaan yang dominan memberikan gambaran mengenai gaya hidup dan keperluan belia di Malaysia. Kajian ini juga mengupas keutamaan jenis perbelanjaan kepada individu dan status kemampuan berbelanja belia untuk item-item tertentu menjadi fokus perbincangan. Ini mencerminkan sejauh mana belia dapat memenuhi keperluan dan keinginan mereka dengan pendapatan yang dimiliki. Perbincangan tentang ketidakmampuan belia dalam menyara kos perbelanjaan menjadi suatu isu yang penting di samping faktor-faktor demografi seperti lokasi dan negeri yang diduduki belia juga turut dikaitkan dengan ketidakmampuan tersebut. Para belia seharusnya mempunyai pengetahuan kewangan,

kesedaran dan persediaan agar dapat membantu mereka dengan lebih baik dalam menghadapi cabaran kos sara hidup yang tinggi.

Rumusannya, terdapat lompang yang boleh diisi oleh kajian ini melalui analisa perbelanjaan makanan, perbelanjaan makanan, perlindungan dan pengangkutan bagi negeri penduduk bujang di negeri Pulau Pinang. Ini kerana beberapa kajian yang ditemui setakat penelitian penulis lebih memfokuskan golongan belia berbanding golongan bujang.

Metodologi Kajian

Metodologi kajian menggunakan kaedah soal selidik yang mempunyai 3 kategori utama iaitu makanan, perlindungan dan pengangkutan. Soal selidik ini diedarkan oleh enumerator bagi memastikan responden memenuhi kriteria. Seramai 44 responden telah disoal selidik yang terdiri daripada 37 lelaki dan 7 perempuan yang terdiri daripada pelbagai tahap pendidikan.

Demografi Responden

Demografi responden dikategorikan mengikut umur (Jadual 1), jantina (Jadual 2), tahap pendidikan (Jadual 3) dan jenis pekerjaan (Jadual 4).

Jadual 1: Responden Mengikut Umur

Umur	Bilangan
20 – 29	23
30 – 39	14
melebihi 40	7

Jadual 2: Responden Mengikut Jantina

Umur	Bilangan
Lelaki	37
Perempuan	7

Jadual 3: Responden Mengikut Tahap Pendidikan

Umur	Bilangan
SPM	1
Diploma	9
Ijazah Sarjana Muda	6
Ijazah Sarjana	13
PhD	15

Jadual 4: Responden Mengikut Jenis Pekerjaan

Umur	Bilangan
Penjawat Awam	12
Swasta	25
Bekerja Sendiri	7

Hasil Kajian

Makanan

Jumlah perbelanjaan makanan boleh dirujuk di jadual 5, didapati yang kategori umur melebihi 40 tahun mempunyai jumlah belanja makanan yang terendah, manakala kategori umur 30 – 39 tahun mempunyai jumlah belanja makanan yang tertinggi.

Jadual 5: Jumlah Perbelanjaan Makanan Mengikut Kategori Umur

Umur	Jumlah Bulanan (RM)
20 – 29	629
30 – 39	693
melebihi 40	507

Perlindungan

Jumlah perbelanjaan perlindungan dipecahkan kepada 3 kategori iaitu ansuran kediaman (Jadual 6), kadar sewa (Jadual 7) dan bil utiliti (Jadual 8). Bagi ansuran kediaman, didapati kategori 20 - 29 tahun tidak mempunyai sebarang komitmen, manakala kategori umur melebihi 40 tahun mempunyai kadar ansuran bulanan yang tertinggi.

Jadual 6: Jumlah Perbelanjaan Ansuran Kediaman Mengikut Kategori Umur

Umur	Jumlah Bulanan (RM)
20 – 29	0
30 – 39	507
melebihi 40	990

Manakala, bagi kadar sewa bulanan, kategori umur 20 – 29 mempunyai jumlah tertinggi dan kategori 30 – 39 tahun mempunyai junlah yang terendah.

Jadual 7: Jumlah Perbelanjaan Kadar Sewa Kediaman Mengikut Kategori Umur

Umur	**Jumlah Bulanan (RM)**
20 – 29	344
30 – 39	253
melebihi 40	285

Bagi bayaran bil utiliti, kategori melebihi umur 40 tahun mempunyai jumlah tertinggi dan kategori 20 – 29 tahun mempunyai junlah yang terendah.

Jadual 8: Jumlah Perbelanjaan Bil Utiliti Mengikut Kategori Umur

Umur	**Jumlah (RM)**
20 – 29	87
30 – 39	125
melebihi 40	193

Pengangkutan

Jumlah perbelanjaan pengangkutan boleh dirujuk di jadual 9, didapati yang kategori umur melebihi 20 - 29 tahun mempunyai jumlah perbelanjaan pengangkutan yang terendah, manakala kategori umur 30 – 39 tahun mempunyai jumlah perbelanjaan pengangkutan yang tertinggi.

Jadual 9: Jumlah Perbelanjaan Pengangkutan Mengikut Kategori Umur

Umur	**Jumlah Bulanan (RM)**
20 – 29	1172
30 – 39	2008
melebihi 40	1796

Kesimpulan

Kesimpulan daripada hasil kajian ini adalah seperti di jadual 10. Hasil kajian dipecahkan kepada 2 kategori iaitu rumah sendiri (ansuran kediaman) dan rumah sewa (kadar sewa).

Hasil kajian mendapati perbelanjaan tertinggi adalah kategori umur melebihi 40 tahun dengan rumah sendiri iaitu sebanyak RM3486 sebulan, manakala yang terendah adalah kategori umur 20 – 29 tahun dengan rumah sendiri sebanyak RM1888 sebulan, ini adalah kerana mereka tidak mempunyai

komitmen untuk membayar ansuran bulanan disebabkan keseluruhan responden kategori umur ini tinggal di rumah keluarga atau menyewa.

Purata perbelanjaan bulanan bagi rumah sendiri adalah sebanyak RM2902 dan bagi rumah sewa adalah sebanyak RM2697. Boleh disimpulkan bahawa anggaran purata perbelanjaan bulanan adalah sebanyak RM2800.

Jadual 10: Jumlah Perbelanjaan Penduduk Bujang Islam di Negeri Pulau Pinang

Umur	**Jumlah Bulanan Rumah Sendiri (RM)**	**Jumlah Bulanan Rumah Sewa (RM)**
20 – 29	1888*	2232
30 – 39	3333	3079
melebihi 40	3486	2781
Purata	2902	2697

*Tiada komitmen bulanan ansuran kediaman kerana tinggal bersama keluarga atau menyewa.

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PENGIRAAN AZIMUTH QIBLAT MELALUI KONSEP TRIGONOMETRI SFERA

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ABSTRAK

Penentuan qiblat terutama di rumah amat penting kerana sekiranya berlaku kesilapan tafsiran, maka pemesongan arah qiblat dalam solat juga akan berlaku. Antara kesensitifan lain juga melibatkan isu-isu contohnya, (1) perbezaan 1^o sekalipun, nilainya sama dengan 122 km dari kedudukan Kaabah sebenar, (2) applikasi penentuan Qiblat secara electronik mudah tersasar kerana gangguan medan magnetik sekeliling, dan (3) kaedah berpandukan arah matahari terbenam juga tidak menjanjikan ketepatan arah kerana kedudukan matahari terbenam di Malaysia akan berubah antara julat darjah azimuth 235^o hingga 295^o. Oleh yang demikian, adalah penting bagi setiap muslim untuk mengetahui cara pengiraan manual bagi mengelakan dari berlaku kesilapan sholat tidak mengadap arah Qiblat sebenar. Keduanya, ianya sebagai panduan untuk memeriksa dan membuat pengiraan sendiri kedudukan arah Qiblat di rumah masing-masing. Pengiraan kaedah lebih memfokuskan pengiraan mudah menggunakan konsep trigonometri sfera dengan bersandarkan koordinat latitud dan longitud sesebuah lokasi serta penggunaan kalkulator saintifik sepeti CASIO fx-570ES PLUS. Hasil pengiraan mendapati koordinat kedua-dua lokasi yang dipilih berada di dalam julat kedudukan Malaysia di antara 291^o -293^o.

Kata Kunci: koordinat, latitud, longitud, trigonometri sfera, Qiblat

Pengenalan

Walaupun di zaman serba canggih ini terdapat pelbagai kaedah moden bagi menentukan arah qiblat, namun yang lazimnya adalah bersandarkan peristiwa Istiwa A'dzam (rembang) yang berlaku dua kali dalam setahun di mana matahari berada tepat di atas Ka'abah dan bayang-bayang objek tegak akan menunjukkan tepat ke arah qiblat sebenar. Kaedah ini boleh dilakukan di mana-mana dan sesiapa sahaja. Semakan waktu Istiwa A'dzam boleh dirujuk di laman sesawang http://mst.sirim.my. Kaedah kedua, kaedah bayang-bayang kiblat (Rashadul Qiblat). Ketiga, penggunaan arah utara (*true north*) sebagai rujukan (Rajah 1-4). Antara lain juga, pengunaan kaedah tradisi merujuk matahari terbenam dan lokasi buruj bintang orion juga boleh digunapakai sebagai panduan pencarian arah qiblat. Di sini saya mengupaskan secara ringkas hasil bacaan dari beberapa artikel dan penglibatan dalam bengkel berkaitan kaedah menentukan arah qiblat secara kiraan manual dengan menggunakan konsep trigonometri sfera.

Apakah yang dimaksudkan dengan arah qiblat? Menurut Pejabat Mufti Wilayah Persekeutuan, Qiblat menurut bahasa adalah arah hadap dan qiblat yang dimaksudkan adalah Ka'abah. Manakala menurut ilmu falak qiblat merujuk kepada arah menghadap ke Kaabah di atas glob bulatan bumi

mengikut jarak yang terdekat. Para ulamak sepakat menyatakan bahawa menghadap ke qiblat merupakan salah satu daripada syarat sah solat melainkan dalam keadaan-keadaan tertentu yang dibenarkan seperti solat ketika dalam peperangan dan solat sunah dalam keadaan bermusafir. Firman Allah SWT dalam surah al-Baqarah ayat 150 yang bermaksud: "Dan dari mana sahaja engkau keluar (untuk mengerjakan sembahyang), maka hadapkanlah mukamu ke arah masjid Al-Haram (Kaabah); dan di mana sahaja kamu berada maka hadapkanlah muka kamu ke arahnya".

Kita boleh juga merujuk kepada laman-sesawang tertentu bagi memberikan butiran informasi kedudukan Kaabah contohnya, https://latitude.to/articles-by-country/sa/saudi-arabia/345/kaaba, dimana kedudukan latitud dan longitud Kaabah dinyatakan seperti di sini: latitud Kaabah : 21° 25' 12.59" N, bersamaan 21.420164986°; manakala longitud Kaabah : 39° 49' 20.39" E, bersamaan 39.822330044°. Manakala, sekiranya kita melayar informasi dari laman-sesawang yang berlainan berkemungkinan akan juga memberikan nilaian kedudukan minit yang sedikit berbeza, seperti 21.3891° N and 39.8579° E (OpenAI, 2024)

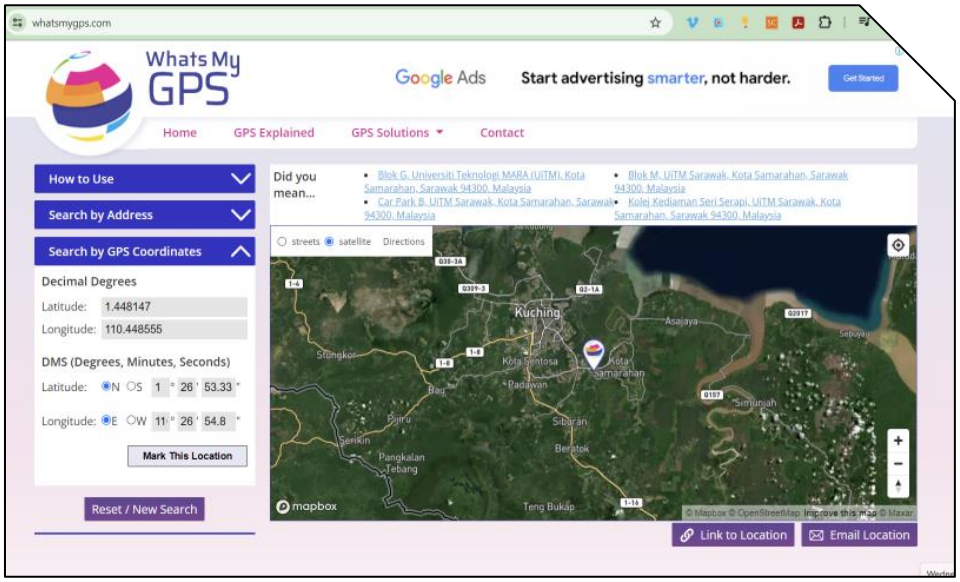
Methodologi

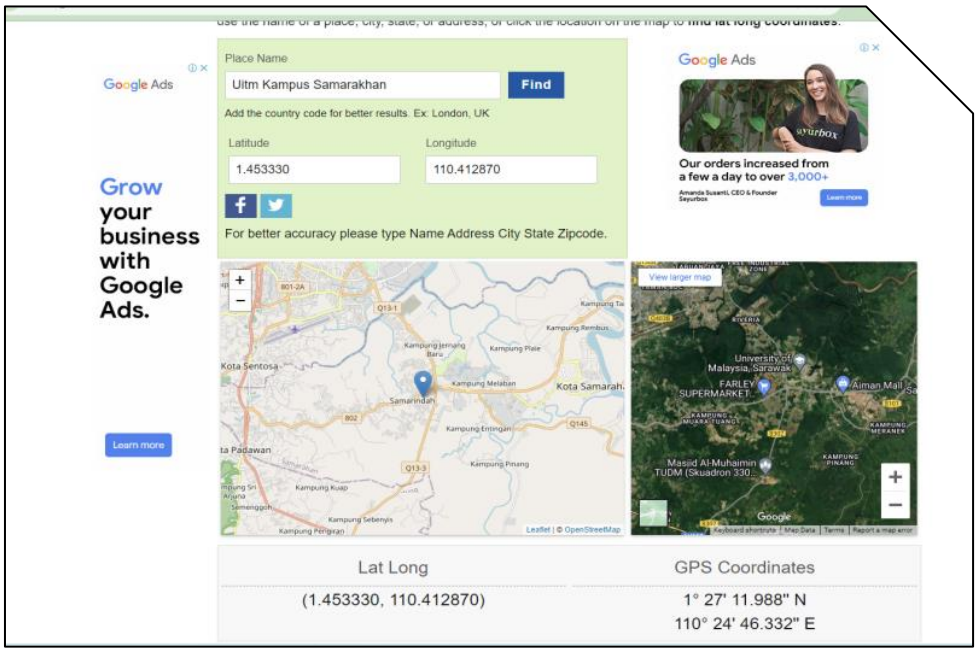
Menurut Profesor Madya Baharrudin Zainal, qiblat bermaksud arah ke Kaabah mengikut jarak terdekat bulatan besar glob bumi (Ahmad Irfan, 2019). Di Malaysia, arah qiblat ditentukan menerusi panduan azimuth pada sudut antara 291^{o} hingga 293^{o}, berdasarkan kedudukan lokasi sesebuah bandar.

(a) Kaedah mendapatkan nilai-nilai koordinat longitud dan longitud

Terdapat pelbagai kaedah dan punca sumber untuk mendapatkan nilai koordinat latitud dan longitud sesebuah bandar atau lokasi. Diantara kaedah yang boleh digunapakai adalah:

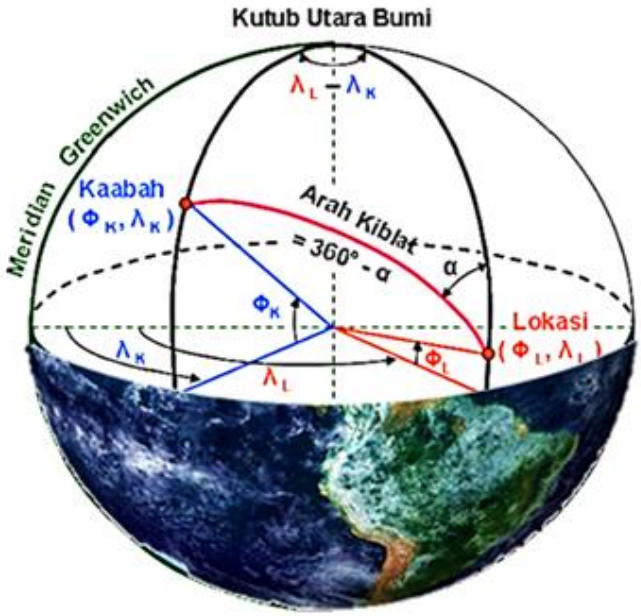
i. Kompas atau e-kompas atau digital kompas
ii. Aplikasi Goggle Maps, https://maps.google.com/
iii. Applikasi Google Earth, https://earth.google.com/
iv. Applikasi telefon pintar atau smart-watch
v. Laman sesawang khas contohnya, https://www.latlong.net/, https://www.gps-coordinates.net/ , https://gps-coordinates.org/ , https://www.whatsmygps.com/ dan sebagaimya (Rajah 1).



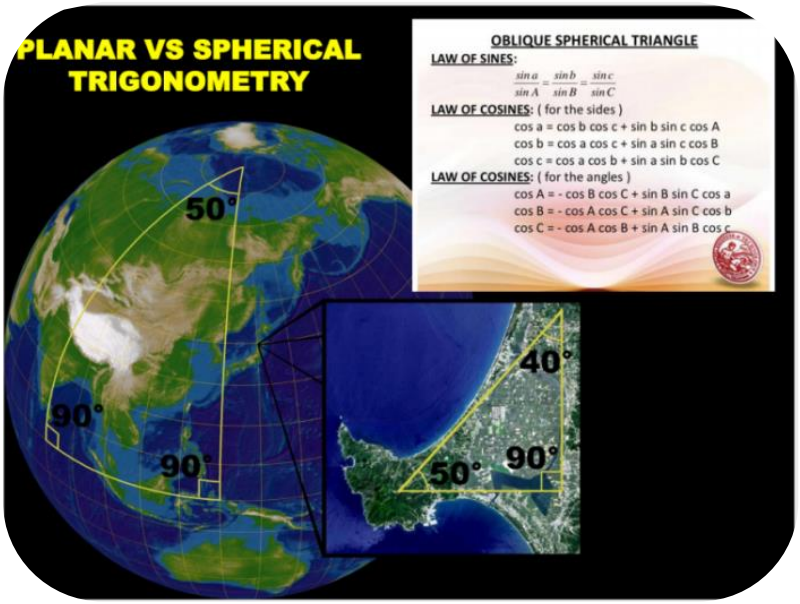


Rajah 1: Paparan pencarian koordinat UiTM Kampus Samarakhan menggunakan aplikasi di laman sesawang https://www.whatsmygps.com/ dan https://www.latlong.net/

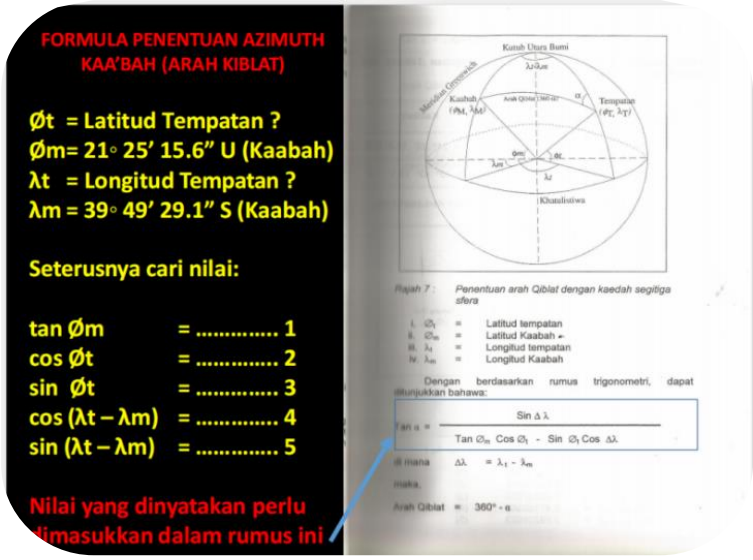
(b) Tatacara pengiraan Azimuth Qiblat



Rajah 2: Kupasan Ringkas Berkenaan Bumi Datar Dari Perspektif Ilmu Falak (25 March 2015).
https://muftiwp.gov.my/ms/falak/bayan-al-falak



Rajah 3 (Joko Satria, 2023)



Rajah 4 (Joko Satria, 2023)

Pengiraan ringkas dan mudah bagi mendapatkan arah qiblat berdasarkan arah utara atau 'true north' dan mengikut tatacara di bawah (Merujuk juga kepada Rajah 2-4):

i. Dapatkan kedudukan lokasi longitud tempatan dan Kaabah (darjah, jam, minit), $\boldsymbol{\lambda_t}$ & $\boldsymbol{\lambda_m}$

`` ii. Dapatkan kedudukan lokasi latitud tempatan dan Kaabah (darjah, jam, minit), φ_t & φ_m

iii. Sediakan kalkulator saintifik, atau e-Kalkulator (contoh: CASIO fx-570ES PLUS)

iv. Masukkan nilai-nilai tersebut di dalam formula:

$$\tan \alpha = \frac{\sin \Delta \boldsymbol{\lambda}}{\tan(\varphi_m)\cos(\varphi_t) - \sin(\varphi_t)\cos(\Delta \boldsymbol{\lambda})} \quad (1)$$

di mana,

$$\sin \Delta \lambda = \lambda_t - \lambda_m$$

Data dan Analisa

Pengiraan kajian dilakukan di atas dua lokasi iaitu pertama, koordinat UiTM Cawangan Pulau Pinang, Kampus Permatang Pauh, dan kedua, koordinat UiTM Cawangan Sarawak, Kampus Samarakhan.

(a) ***Sampel 1*** **:**

i. Latitud UiTM Kampus Permatang Pauh: $\boldsymbol{\varphi_t}$ **= 5° 22' 57.8" N**

ii. Longitud UiTM Kampus Permatang Pauh: $\boldsymbol{\lambda_t}$**= 100° 24' 50.6" E**

iii. Latitud Makkah Mukarramah: $\boldsymbol{\varphi_m}$ **= 21° 25' 20.9532'' N**

iv. Longitud Makkah Mukarramah: $\boldsymbol{\lambda_m}$ **= 39° 49' 34.3416'' E.**

$$\tan\alpha = \frac{\sin(\boldsymbol{\lambda}_t - \boldsymbol{\lambda}_m)}{\tan(\varphi_m)\cos(\varphi_t) - \sin(\varphi_t)\cos(\Delta\boldsymbol{\lambda})} \tag{2}$$

$$= \frac{\sin(100° 24' 50.6" \text{ E} - 39° 49' 34.3416'' \text{ E})}{\tan(21° 25' 20.9532'' \text{ N})\cos(5° 22' 57.8" \text{ N}) - \sin(5° 22' 57.8" \text{ N})\cos(100° 24' 50.6" \text{ E} - 39° 49' 34.3416'' \text{ E})} \tag{3}$$

$$= \frac{\sin(60° 34' 31.66'')}{\tan(21° 25' 20.9532'' \text{ N})\cos(5° 22' 57.8" \text{ N}) - \sin(5° 22' 57.8" \text{ N})\cos(60° 34' 31.66'')} \tag{4}$$

$$= \frac{0.871003481}{(0.3923485333)(0.9955902981) - (0.09380809324)(0.4912768359)} \tag{5}$$

$$= \frac{0.871003481}{(0.3906183932) - (0.04608574323)} \tag{6}$$

$$= \frac{0.871003481}{(0.34453265)} \tag{7}$$

$$= \mathbf{2.528072393} \tag{8}$$

Justeru itu,

$$\tan\alpha = \frac{\sin(\boldsymbol{\lambda}_t - \boldsymbol{\lambda}_m)}{\tan(\varphi_m)\cos(\varphi_t) - \sin(\varphi_t)\cos((\boldsymbol{\lambda}_t - \boldsymbol{\lambda}_m)} = \mathbf{2.528072393} \tag{9}$$

Menjadikan,

$$\alpha = tan^{-1}(\mathbf{2.528072393}) = 68.41831483 = \mathbf{68° 25' 5.93''} \tag{10}$$

Maka arah Qiblat bagi koordinat UiTM Kampus Permatang Pauh adalah ,

$$360^o - \alpha = 360^o - \mathbf{68° 25' 5.93''} = \mathbf{291° 34' 54.07''.} \tag{11}$$

(b) ***Sampel 2:***

i. Latitud UiTM Kampus Samarahan: $\boldsymbol{\varphi_t}$ **= 1° 27' 11.988'' N atau 1.448147º**

ii. Longitud UiTM Kampus Samarahan: $\boldsymbol{\lambda_t}$**= 110° 24' 46.332'' E atau 110.412870º**

iii. Latitud Makkah Mukarramah: $\boldsymbol{\varphi_m}$ **= 21° 25' 20.9532'' N**

iv. Longitud Makkah Mukarramah: $\boldsymbol{\lambda_m}$ **= 39° 49' 34.3416'' E.**

$$\tan\alpha = \frac{\sin(\boldsymbol{\lambda_t} - \boldsymbol{\lambda_m})}{\tan(\varphi_m)\cos(\varphi_t) - \sin(\varphi_t)\cos(\boldsymbol{\lambda_t} - \boldsymbol{\lambda_m})}$$

$$= \frac{\sin(110° 24' 46.332'' \text{ E} - 39° 49' 34.3416'' \text{ E})}{\tan(21° 25' 20.9532'' \text{ N})\cos(1° 27' 11.988'' \text{ N}) - \sin(1° 27' 11.988" \text{ N})\cos(100° 24' 46.332" \text{ E} - 39° 49' 34.3416'' \text{ E})} \quad (12)$$

$$= \frac{\sin(70° 35' 11.99'')}{\tan(21° 25' 20.9532'' \text{ N})\cos(1° 27' 11.988'' \text{ N}) - \sin(1° 27' 11.988'' \text{ N})\cos(70° 35' 11.99'')} \quad (13)$$

$$= \frac{0.9431453195}{(0.3923485333)(0.9996783157) - (0.02536267368)(0.3323806665)} \quad (14)$$

$$= \frac{0.9431453195}{(0.3922223209) - (0.008430062)} \quad (15)$$

$$= \frac{0.9431453195}{(0.3837922589)} \quad (16)$$

$$= \mathbf{2.4574370563} \quad (17)$$

Justeru itu,

$$\tan\alpha = \frac{\sin(\boldsymbol{\lambda_t} - \boldsymbol{\lambda_m})}{\tan(\varphi_m)\cos(\varphi_t) - \sin(\varphi_t)\cos((\boldsymbol{\lambda_t} - \boldsymbol{\lambda_m})} = \mathbf{2.4574370563} \quad (18)$$

$$\alpha = tan^{-1}(\mathbf{2.4574370563}) = 67.85721493 = \mathbf{67° 51' 25.97''} \quad (19)$$

Maka arah Qiblat bagi koordinat UiTM Kampus Samarahan,

$$360^o - \alpha = 360^o - 67° 51' 25.97'' = \mathbf{292° 8' 34.03'' \text{ atau } 292.1427851°} \quad (20)$$

Merujuk kepada perbandingan pengiraan kedua-dua lokasi UiTM terlibat, kedudukan kedua-duanya berada di dalam julat kedudukan Malaysia iaitu menerusi panduan azimuth qiblat pada sudut antara 291^{o} hingga 293^{o}, berdasarkan kedudukan lokasi sesebuah bandar (Ahmad Irfan, 2019). Maka cara pengiraan kendiri ini boleh dijadikan panduan kendiri dalam menentukan arah qiblat di mana sahaja kita berada selagi mana kita tahu koordinate sesuatu lokasi itu.

Konklusi

Secara konklusinya, sebagai seorang muslim sholat itu bukanlah satu kewajiban yang boleh diambil ringan. Mencari ilmu dalam memastikan lokasi arah qiblat yang tepat pastinya suatu ilmu yang dituntut oleh Islam, dan ianya merupakan satu keperluan muakad aula pra-sholat. Justeru itu, kaedah berlandaskan trigonometri sfera ini boleh diamalkan bagi memastikan arah qiblat ketika bersholat tidak tersasar jauh dari kedudukan arah Ka'abah yang sebenar.

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FUNCTIONAL PROGRAMMING PARADIGM WITH SCHEME PROGRAMMING LANGUAGE

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ABSTRACT

Functional programming (FP) is a paradigm which the expression is written in declarative style or bind the expression as mathematical function. FP treats functions as data. Basically, this paradigm was introduced for mathematical computation. Anything that can be computed by the FP than it is considered as computable. Currently, this paradigm has been introduced as an elective or optional course to the students at the tertiary level of education. Other than FP paradigms, the students are also introduced with the structured, object-oriented, logic and scripting paradigms. The main purpose of introducing varieties of programming paradigms is to make sure that the students are able to choose appropriate programming language related to their project scopes and domain. The FP paradigms focus on what is the expected result the program should produce rather than on how the result will be get as applied in structured and object-oriented programming paradigms. This article will discuss details on the characteristics, example of codes which uses the Scheme programming language and implementation of the FP paradigms in the real life.

Keywords: functional programming (FP), paradigms, scheme, lambda calculus

Introduction

Functional programming (FP) is based on lambda calculus which was developed by Alonzo Church in 1930s, for studying computations with functions (Bhadwal, 2022). The coding in FP is a declarative type that is focusing on what to solve instead of on how to solve. The function is the main element in the FP, similarly as object becomes the main tools in the object-oriented programming (Vishal, 2022). Examples of programming languages that support the FP paradigms are Haskell, JavaScript, Python, Scala, Erlang, Lisp, ML, Clojure, OCaml, Common Lisp, Scheme and Racket.

One of the uniqueness of FP is the implementation of recursive functions to avoid the common repetition control structures such as the `for` loop, `while` or the `do..while` loops as implemented in imperative programming paradigms. FP applies the immutable data approach which the data state cannot be modified or changed after it is created. The traditional approach of programming paradigm such imperative or structured programming applied the mutable data approach which the code will overwrites the old data whenever the new data is available. FP paradigm supports the parallel programming and concurrency for multilayer computations (Khanfor & Yang, 2017). Moreover, FP diverges from the practice of relying on the sequence of codes for application execution, a characteristic seen in imperative or object-oriented programming paradigms (Parewa, 2022).

Characteristics of Functional Programming (FP)

FP consists of predefined or user-defined functions. Each function will be defined according to the given expression. Expressions will be formed to construct a special function which consists of other functions as substitution function, variables and constant values. Every expression should be represented by certain values and the computation will be done to determine the results (Chitil, n.d.). Computation in FP using the **Cambridge Prefix notation** as shown in table 1 below.

Table 1: Computation of expression in imperative vs FP

Imperative paradigm (Infix expression)	Functional paradigm (Prefix notation)
`5 + 4 + 4 + 3`	`+ 5 4 4 3`
`5 – 4 + 3`	`+ – 5 4 3`
`(9 + 4) * (5 – 2)`	`(* (+ 9 4) (– 5 2))`

FP has a special feature which allow the user to delay the processing or computation. This feature is called as **lazy evaluation**. Lazy evaluation is defined as the expressions will be evaluated whenever it is actually needed or required only (GNU, n.d.). The following table 2 shows the difference of eager evaluation and lazy evaluation as applied in functional paradigm by using the Scheme programming language.

Table 2: comparison of eager and lazy evaluation

(Eager evaluation)	(Lazy evaluation)
(define (eager x y)(+ (expt x 2) (expt y 2))) > (eager 6 8) 100 ; the expressions will be evaluated immediately whenever the value is given.	(define (lazy x y) (delay (+ (expt x 2)(expt y 2)))) > (lazy 7 8) #<promise:lazy> ; no result shown here > (force (lazy 7 8)) 113 ; the result shown here after forced ; the command 'delay' delayed the expressions evaluation. It will be processed whenever it is needed by using the command 'force' for immediate computation.

FP is actually based on the **lambda calculus** which in turn provides a framework for studying decidability questions of programming (Aaby, 1998). The function can be created using the Scheme programming language either by implementing or not implementing the keyword 'lambda'. The following table 3 shows the definition of Pythagorean Theorem.

Table 3: Pythagorean Theorem with Lambda or without Lambda command

Without Lambda	With Lambda
(define (pythagorean a b) **(sqrt (+ (expt a 2) (expt b 2))))** (display " Enter the value of a ") (define a(read)) (display " Enter the value of b ") (define b(read)) (define result(pythagorean a b)) (display " The result is ") (newline) (display result) **Output:** **Enter the value of a 6** **Enter the value of b 8** **The result is** **10**	**(define pythagorean (lambda(a b)** **(sqrt (+ (expt a 2) (expt b 2)))))** (display " Enter the value of a ") (define a(read)) (display " Enter the value of b ") (define b(read)) (define result(pythagorean a b)) (display " The result is ") (newline) (display result) **Output:** **Enter the value of a 6** **Enter the value of b 8** **The result is** **10**
The name of the function is pythagorean and sends two parameters, a and b.	The name of the function is pythagorean and the lambda function sends two parameters, a and b.

FP allows us to store multiple data or arguments in a list (Othman et. al, 2019). Additionally, the commands `cons` can be used to construct pairs and pairs are used to construct lists. The `car` and `cdr` commands enable us to retrieve the first element or argument from the list and extract the remainder arguments except the first argument of the list respectively. Figure 1 shows the implementation of the commands `list`, `cons`, `car` and `cdr` in Scheme programming language.

```
(list '(ali abu ibrahim jusoh aminah raju kamilia))
> ((ali abu ibrahim jusoh aminah raju kamilia)) ; → list contents
(cons '(ali abu) '(ibrahim jusoh aminah raju kamilia))
> ((ali abu) ibrahim jusoh aminah raju kamilia) ; → contents in the list by using the cons command

(car '(ali abu ibrahim jusoh aminah raju))
> Ali ; → the first element from the list

(cdr '(ali abu ibrahim jusoh aminah raju))
> (abu ibrahim jusoh aminah raju); → the remainder elements from the list except the first element

> (define flower '(rose tulip carnation chrysanthemum orchid))
> flower
(rose tulip carnation chrysanthemum orchid) ; → flower is a list which consist name of flowers
> (car flower)
rose; → first element of the flower lists.
> (cdr flower)
(tulip carnation chrysanthemum orchid); → the remainder elements of the flower lists
```

Figure 1: implementation of list, cons, car & cdr commands in Scheme programming language

Similar to other type of programming paradigms, the FP is also providing the selection control structures such as the `cond` or `case` for multiple conditions and `if` for single or dual conditions (Othman et. al, 2019). The following table 4 shows the implementation of selection control structures in Scheme programming language as compared to imperative paradigm and the output as shows in table 5.

Table 4: Implementation of selection control structures in FP as compared to Imperative paradigm.

Imperative Paradigms with C

```
#include <stdio.h>
float rateFunct(char);
float bonusFunct(float);

int main()
{
        char workertype;
        float rateperday, totalsalary, bonus, totalall;
        int numberofworkingdays;

        printf("\n Payroll System ");
        printf("\n Worker Type ");
        printf("\n A. Senior Manager ");
        printf("\n B. Manager ");
        printf("\n C. Supervisor ");
        printf("\n D. Production line worker ");
        printf("\n ? ");
        scanf(" %c", &workertype);
        printf("\n Number of working days : ");
        scanf("%d",&numberofworkingdays);

        rateperday = rateFunct(workertype);
        totalsalary = rateperday * numberofworkingdays;
        totalall =  totalsalary + bonusFunct(totalsalary);

        printf("\n Salary RM %.2f ",totalsalary);
        printf("\n Bonus RM %.2f ",
                        bonusFunct(totalsalary);
        printf("\n Salary+Bonus RM %.2f ",totalall);
        printf("\n Thank you ");

        return 0;
}

float rateFunct(char workertype)
{       float rateperday;
        if (workertype == 'A' or workertype == 'a')
                rateperday = 200;
        else if (workertype == 'B' or workertype == 'b')
                rateperday = 150;
        else if (workertype == 'C' or workertype == 'c')
                rateperday = 100;
        else if (workertype == 'D' or workertype == 'd')
                rateperday = 75;
        else
                rateperday = 0;
         return rateperday;
}

float bonusFunct(float totalsalary)
{       float bonus;
        if (totalsalary > 3000)
                bonus = 300;
        else
                bonus = 150;
        return bonus;
}
```

Functional Paradigms with Scheme

```
#lang scheme

(define (get-rate)
  (display "Payroll System")
  (newline)
  (display "Worker type ")
  (newline)
  (display "A. Senior Manager ")
  (newline)
  (display "B. Manager ")
  (newline)
  (display "C. Supervisor ")
  (newline)
  (display "D. Production line worker ")
  (newline)
  (display "?")
  (let ((code (read)))
    (newline)
    (cond
      ((or (eq? code 'A)(eq? code 'a)) 200)
      ((or(eq? code 'B)(eq? code 'b)) 150)
      ((or(eq? code 'C)(eq? code 'c)) 100)
      ((or(eq? code 'D)(eq? code 'd)) 75)
      (else 0))))

; another option to apply the case control structure
  ; as shown below
  (case code
    ((A a) 200)
    ((B b) 150)
    ((C c) 100)
    ((D d) 75)
    (else 0))))

(define (get-workingdays)
  (display "Number of working days :")
  (read) )

(define (main)
  (let* ((rate (get-rate))
         (numberofworkingdays(get-workingdays))
         (tot-salary (* rate numberofworkingdays))
         (bonus (if (>= tot-salary 3000) 300 150))
         (tot-all (+ tot-salary bonus)))
    (display "Salary RM ")
    (display tot-salary)
    (newline)
    (display "Bonus, RM ")
    (display bonus)
    (newline)
    (display "Salary+Bonus, RM ")
    (display tot-all)
    (newline)
    (display "Thank you")
  ))

(main)
```

Table 5: The output of selection control structures in FP as compared to Imperative paradigm.

Imperative Paradigms with C	Functional Paradigms with Scheme
Output : **Payroll System** **Worker Type** **A. Senior Manager** **B. Manager** **C. Supervisor** **D. Production line worker** **? A** **Number of working days: 30** **Salary RM 6000** **Bonus RM 300** **Salary+Bonus, RM 6300** **Thank you**	**Output :** **Payroll System** **Worker type** **A. Senior Manager** **B. Manager** **C. Supervisor** **D. Production line worker** **? A** **Number of working days: 30** **Salary RM 6000** **Bonus, RM 300** **Salary+Bonus, RM 6300** **Thank you**

Functional paradigms in Scheme programming language provides a predicate type which it is a built-in procedure that always returns the boolean value (`#t` or `#f`) (Racket, n.d.). The following table 6 shows the lists of built-in procedures with predicate type in Scheme programming language.

Table 6: List of Built-in Procedures with Predicate type in Scheme Programming Language

Predicate Type	Function or purposes	Example

> (procedure? f1)	To examine the existence of the function name	`> (define add (lambda (x y) (+ x y)))`
		`> (procedure? add)`
		`#t`

> (null? mylist)	To examine the list is empty or not empty	`> (define mylist '(a b c d e))`
		`> (null? mylist)`
		`#f`
		`> (define nextlist '())`
		`> (null? nextlist)`
		`#t`

> odd?
> even?
	To determine either the number is even or odd number	`> (define x 10)`
		`> (even? x)`
		`#t`

> boolean?	To determine either the expression is true or false	`> (boolean? (> 9 3))` `> #t`
> negative? **> positive?**	To determine the expressions or value is a negative of positive value	`> (positive? (- 10 -12))` `#t`

> eq?	To determine the value is similar with the value assign to another identifier	`> (define option1 'A)`
		`> (define option2 'a)`
		`> (define option3 'A)`
		`> (eq? option1 option2)`
		`#f`
		`> (eq? option1 option3)`
		`#t`

**only the most frequently used of built-in predicate are listed here*

Scheme has no expressions designed for looping. The only easy way to do this is recursion, that is, designing a procedure such that it meets 2 criteria which the procedure must have a base case that it stops at and the recursive function. Recursive is a function or procedure that calls itself. In Scheme programming language, simple code of iteration can be achieved through recursion by having a function that call itself. Most programs are tail recursive, where the recursive function calls the last action that occurs. In other words, there is no need to return for further execution of the n-th iteration of the function after the recursive function calls the (`i+1`) iteration (Southwestern University, n.d). The following table 7 shows the implementation of recursive function in C and Scheme programming language for Fibonacci problems.

Table 7: Recursive function in C and Scheme Programming language

Imperative paradigm (C programming)	Functional paradigm (Scheme Programming)

#include <stdio.h>
int fibonacci(int);
int main()
{
int number, result;
printf("\n Enter a number : ");
scanf("%d", &number);
 	
result = fibonacci(number);
 	
printf("\n The fibonacci number for
%d is %d ", number, result);
 	
return 0;
}
 	
int fibonacci(int x)
{
if (x == 0)
return 0;
else if (x == 1)
return 1;
else
return (x + **fibonacci(x-1)**);
}
 	
Output :
Enter a number : 5
The fibonacci number for 5 is 15
	#lang scheme
	(define fibonacci (lambda (x)
	(cond ((eq? x 0) 0)
	((eq? x 1) 1)
	(else **(+ x (fibonacci (- x 1)))**)
	)
	)
	)
	
	(display "Enter a number : ")
	(define x(read))
	(newline)
	(define fibo(fibonacci x))
	(display "The fibonacci number for ")
	(display x)
	(display " is ")
	(display fibo)
	
	Output :
	Enter a number : 10
	The fibonacci number for 10 is 55

Functional Programming (FP) Applications

Quite rare actually we heard or found the commercial application systems which implements the FP paradigms. FP is not the most common paradigm, and most developers are not intimately familiar with its features and syntaxes. Another main reason is the use of recursion structure instead of ordinary loops in the making of the application makes most of the developers are refused to use the FP paradigm. Parallelism processing is the most demanding field which are now increasingly applied in industrial and commercial area. The strength of parallelism tools to solve the concurrency issues in FP, has developed the consciousness and confidence among developers to use FP paradigm.

Nowadays, FP applications appear in diverse fields such as complex networking switches, event correlation managers, expert contract valuators, integrated circuit designers, theorem provers & model checkers, natural language processors and robotics and manufacturing (ByteScout, n.d.). First FP success story begins when one of the largest global manufacturers of telecommunications equipment, Ericsson which operates in more than 100 countries and 80,000 employees, uses the Erlang FP language in a variety of telecommunications and networking devices. Applications developed for this equipment prove highly reliable with only a few seconds of downtime over the course for many years. The second FP application is the chip design assistant. Bluespec is a commercial company has claimed that the development of their chip design assistant platforms derives from the Haskell FP language. The third example of FP application is Jane Street Capital located in US is a proprietary trading firm involved in financial markets around the world used the FP paradigm to develop sophisticated statistical research operating over terabytes of data as well as real-time systems that demand performance (Wadler, n.d.).

Conclusion

In conclusion, FP is a paradigm that treats computation as the evaluation of mathematical functions and avoids changing-state and mutable data. It emphasizes immutability, lazy evaluation, and the use of higher-order functions. FP languages, such as Haskell, Lisp, and Scheme, have increased popularity for their ability to improve source code simplicity, modularity, and maintainability. Moreover, functional programming aligns well with modern trends in software development, such as the rise of distributed systems and the increasing importance of parallel processing in a world of multi-core processors. As the industry continues to evolve, functional programming concepts are likely to become even more relevant, influencing not only specialized functional languages but also mainstream languages that adopt functional features. Ultimately, the adoption of functional programming is a matter of choosing the right tool for the task at hand. It may not be suitable for every project, but incorporating functional programming principles into one's coding practices can lead to more robust, modular, and maintainable software systems.

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NOTE TAKING VS NOTE MAKING

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ABSTRACT

Taking notes is an important skill for both students and professionals. Note-taking has experienced a digital shift since the emergence of technology. Students nowadays have more options than the traditional approach of taking notes on paper with pencils. Using instructional technology, educators are developing innovative note-taking strategies. Making notes is also common when reading books, journals, and other reference materials for essays, seminars, presentations, theses, and exams. These exercises are also useful for researchers and teachers who desire to succeed in their fields. We use the terms note taking and note making to identify the two processes of listening and reading described above. Note taking is a passive process that is performed by students or listeners during lectures, whereas 'note making' is a more active and concentrated action that is performed after reading a book or article and noting down relevant and required information. Note taking and note creation are two related important academic abilities that students and researchers must develop, but they must be approached with caution for maximum utility. This article discusses the concepts of taking and making notes, outlining the distinctions between them.

Keywords: Note-taking, Note-making, passive, active, information.

Introduction

Our memory is limited, but our knowledge is vast and boundless. We are not always able to remember everything. Consequently, taking notes is crucial. Taking notes is meant to assist us in retaining important information by helping us filter it. Taking notes involves more than just recording what you read or hear; it also involves synthesizing and revisiting ideas you have learned from reading or lectures. Notes are an important record of information that may aid in preparation for a seminar, presentation, assignment, or examination. People often jot down notes or information they want to remember or that serve as reminders of something to do later (Hartley 2002, Hawkins 2010). Initially, note-taking is presented as an academic tool for learning (Howe 1974). It allows the individual to record and retain information for later use. The process of taking notes is commonly known as note taking. There is, however, a distinction between taking notes and making notes.

Note-taking, or better yet, note-making, occurs at all educational levels (from elementary school to university) and takes different forms. Examples include writing notes on a whiteboard or flipchart, summarizing or answering lectures on paper or a laptop, and annotating similarity or digital texts.

However, the learning sciences and other positive approaches have embraced it, primarily viewing it as a tool for learning (see Kiewra et al.,1991; Kobayashi, 2006; Mueller & Oppenheimer, 2014; Reed et al.,2016). This contrasts with the philosophy of education, which has mostly ignored it.

One of the main differences between taking and writing notes is that when you take notes, you attempt to write down or capture everything that is said. On the other hand, when you take notes, you are trying to recall the most important information and summarize it in a way that makes sense to you. Another distinction is that when taking notes, you often use a notepad and a pen or pencil. To take notes, you can use any device, such as a computer, tablet, or phone. Taking notes is mostly used to assist you in remembering what was said or written. When you take notes, you usually do it to help you with a project.

According to Zamojski and Vlieghe (2017), taking notes is a valuable educational activity in and of itself, not only a means to an end (like learning). Making notes during a lecture is a reconstruction process in which students replicate the teachers' voice in their notes. Making the teachers' prepared notes available to the public showcases their way of thinking. The lecturers' and students' note-taking are thus inseparable, and perhaps inverse: the teacher constructs, the teacher and student co-construct, and the students rebuild. Making notes is thus not only a mental or representational experience, but also one that is embodied and productive, as well as one of 'potentiality' (Lewis, 2013).

Meaning of Note Taking

Taking notes is the process of systematically recording information in minimal parts. Writing down or recording in a descriptive manner what you see, hear, or read at lectures, tutorials, webinars, and seminars is the first step in creating an effective note. The act of recording information obtained from another source is another name for note-taking. By taking notes, the writer releases his or her mind from seeking to remember every detail of the information by capturing what is important.

When taking notes, they must be copied verbatim from the source and rewritten in a comparable style. It is also like noting most of what you read or hear without thinking about it. It also involves trying to cover up most of the material without emphasizing the main idea or problem. It is self-evident that taking notes is what we do whether we attend lectures, watch movies, or read a book. Note taking is, for example, copying what your lecturer or teacher is saying or teaching in a lecture hall or classroom.

Examples of Note Taking

i- Cornell Notes

ii- Guided Notes

iii- Outlining

Meaning of Note Making

Making notes is the activity of keeping records from many sources. It is more than just writing down what you hear or see. Note taking is a more cerebral activity than note taking because it requires you to choose, analyse; and summarise what you hear and read. Making notes is thus an active way of study because it requires you to think because you must make decisions about what you write.

In other words, note making involves taking different notes from lectures, films, and books and compiling the information into a briefing that you will use for revision or future reference. What is instructive about making notes, according to Bravo Palacios and Simons (2014), is that students learn to balance their authority and the authority of the teacher; originality and imitation; mental, physiological, and emotional states; and concentration and distraction.

Examples of Note Making

i- Mind Mapping

ii- Digital Gardening

iii- Zettelkasten method

Difference between Note Taking and Note Making

Although note taking and note making share some of the same characteristics as previously discussed, making it challenging for people to tell them apart and simply refer to note taking, there are also distinct differences between the two. The differences are:

1. Note-taking is a quicker process than note-making, and this is one of the main distinctions between the two. Beginning to take notes takes minimal time and effort. It is more practical to take notes quickly because important thoughts and details can be observed during a meeting or lecture. On the other hand, making notes takes more time, but the result is a more thorough and structured set of notes.
2. Note making is easier to grasp than Note taking in class or elsewhere because Note Making allows you to add your own thoughts to what you are writing down, whereas Note taking simply copies down what you hear or see.
3. Note taking involves taking points from a single source at a time, whereas Note Making involves taking points from a various source.
4. Taking notes involves jotting down what you hear or read without processing the information, whereas making notes involves analysing what you hear or read.
5. Taking notes is a passive method for studying, whereas making notes is an active method for studying.

Conclusion

In conclusion, according to Edgar Wright (1962) in his book on Study Methods, the difference between Note Taking and Note Making is that Note Taking occurs frequently while listening and the goal is to quickly capture the content so we can refer to it later. Note Making occurs more frequently while reading and consists of deliberately crafting your own version so you can learn and create better. It does not matter how the notes are taken, cultivating the right way of taking notes is emphasized. By making your own notes based on the understanding found, this will increase your memory of things.

According to Muniroh (2021), taking notes and making notes, on the other hand, should not be a tough task; rather, it should be a simple action that helps students recall what they have just learned. The experience of making or copying notes is valuable because of that effort we will feel proud when we understand then and can be use them needed.

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FINANCIAL LITERACY AND SPENDING HABITS OF UITM STUDENTS

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ABSTRACT

Interest in examining personal finance issues, particularly money management, has surged in recent years as society recognizes its significance. Proficiency in money management is a crucial aspect of preparing students for a quality life as working adults, given that their spending habits during their university years can significantly impact their financial behavior in the future. Reviewing existing literature from research conducted outside of Malaysia underscores the necessity for financial literacy among students to preempt potential challenges arising from a lack of knowledge in individual financial management. This study underscores the pivotal role of financial literacy among students by delving into their background, family income and spending habits. The research utilizes data gathered from questionnaires, analyzed using SPSS version 26.0. The correlation coefficient of 0.697 between financial literacy and spending habits for university students shows a strong positive relationship, meaning that when students know more about finances, they tend to spend money more wisely. This highlights the need for universities to teach students about managing money effectively to help them make better financial decisions.

Keywords: spending habits, financial literacy, university students, relationship, Pearson correlation coefficient

Introduction

The younger generations in Malaysia are increasingly exhibiting uncontrolled spending behaviours. When it comes to spending, people often regard money less highly than preceding generations did. According to Esmail Alekam et al. (2018), the rising cost of living in Malaysia has caused younger generations to spend their money extravagantly, changing the country's spending habits and way of life.

Carter (2014) defines spending as the act of allocating funds to purchase things or services that a person needs or desires. To name a few, they include clothing, food, shelter, healthcare, and transportation. Several factors influence people's different spending patterns. Numerous factors, including age, wealth, gender, ethnicity, family history, personality, and more, come into play. Thus, we must ascertain the level of awareness among our nation's youth regarding various financial services and activities. It's critical that students not only possess financial information but also apply it to their everyday lives.

People that are financially literate are better equipped to manage their personal resources. According to study by Lusardi and Mitchell (2007), financial literacy is the ability to understand money in order to minimise financial risk. It is possible to determine an individual's degree of financial literacy by looking at how familiar and knowledgeable they are with different financial topics. Another aspect of financial literacy is understanding financial resources and knowing how to use them in daily life (Hutson, 2010). Experts believe that financial literacy is the understanding of financial principles needed to identify and steer clear of financial risks and accumulate wealth.

Investigating student financial literacy levels and strategies for raising financial awareness are so crucial. The purchasing habits of university students have contributed to an increase in bankruptcies and social troubles among the younger generation, frequently related to their financial capacities, making university students' spending habits one of Malaysians' most pressing worries today, according to AsiaNews (2018).

According to Rakow (2019), university students' inadequate money management is the root of their lack of financial literacy. Financial catastrophes, debt, bankruptcy, and careless spending follow from this. For instance, the Malaysian Parliament stated that over 64,000 Malaysians between the ages of 18 and 44 had been declared bankrupt over the previous five years. Young people are therefore working seven days a week, twenty-four hours a day, merely to pay off their debt.

Compared to earlier generations, the younger generation now spends more money on online gaming, convenience, travel, socialising, and online shopping than on homes and cars. This poor habit has an impact on the way the younger generation spends money since they tend to follow trends and buy anything they want without giving it much thought. This unhealthy behaviour will lead to issues like not having enough money to pay for PTPTN loans, rent, auto loans, and other expenses. Thus, attention must be paid to this issue in order to prevent negative habits from developing in the younger generation, particularly among students.

The main objective of the study is to investigate the influence of the spending habits of Malaysian university students. The objective of the study is to find out if there is a relationship between the independent variables (financial literacy) and the dependent variable (spending habits).

Methodology

The study targeted students from Universiti Teknologi MARA, Pulau Pinang, with the survey being exclusively conducted online. To ensure a representative sample, the researchers employed stratified

random sampling, categorizing the overall population into smaller groups based on gender, age, education level, type of institution, and parents' income. This approach was chosen to streamline data collection and mitigate the risk of a low response rate.

The study utilized measurement scales, primarily the Likert-Five scale, due to its compatibility with a large sample size. Employing an online survey facilitated a faster and more efficient data collection process. The questionnaire, shared through WhatsApp groups, was distributed to all eligible students on campus. Data collection involved sending questionnaires to the intended respondents, covering three main sections: i. Demographic Profile, ii. Dependent Variable (Spending Habits), and iii. Independent Variable (Financial Literacy).

Statistical Package for Social Sciences (SPSS) version 26.0 was employed to code and analyze the data. The analysis phase included appropriate descriptive statistics, reliability analysis and correlation analysis. The choice of statistical methods depended on factors such as the measurement scale, the number of variables, and the nature of the questions posed. The frequency distribution is obtained for all categorical variables (demographic data). The strength of the relationship between the dependent and independent variables more specifically, the relationship between the dependent variable (spending habits) and the independent variable (financial literacy) is evaluated using the correlation analysis (Sekaran, 2003). There is no association between the variables if the correlation value is zero (R=0), whereas a correlation value of one indicates that the dependent and independent variables have a perfect relationship.

Results and Discussion

This section presents the results and discussions of the descriptive analysis, reliability analysis, and correlation analysis between financial literacy and spending habits among students in UiTM Pulau Pinang. The researchers determined the relationship between the two variables through analysis and interpretation of the gathered data using Pearson’s correlation, R.

Figure 1 showed pie chart for respondents’ gender. Among the respondents, 45.6% were male, accounting for a total of 26 individuals. Conversely, 54.4% of the respondents were female, totalling 31 individuals. Table 1 and figure 2 showed the frequency and percentage for respondents’ age group. The majority of students, comprising 56.1% of the total, fall within the age range of 21 to 23 years old. The next largest group is individuals aged 24 to 26 years old, representing 22.8% of the total respondents. Those aged 18 to 20 years old make up 17.5% of the respondents, while the smallest group consists of individuals aged 27 to 30 years old, accounting for 3.5% of the total.

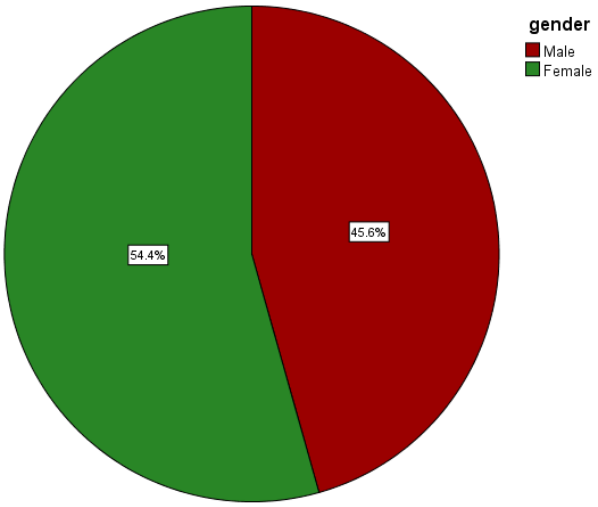

Figure 1: Pie chart for gender

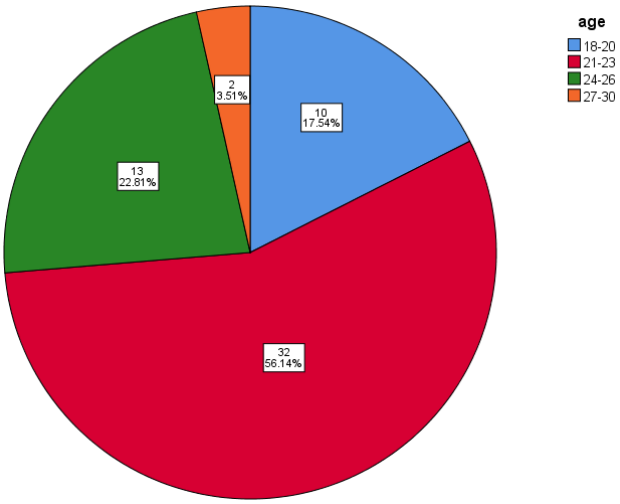

Figure 2: Pie chart for respondents' age group

Table 1: Frequency and percentage for respondents' age group

Age group	Frequency	Percent
18 – 20 years old	10	17.5
21 – 23 years old	32	56.1
24 – 26 years old	13	22.8
27 – 30 years old	2	3.5
Total	57	100.0

Bar chart below provides insight into the distribution of family income among students. The majority of students, comprising 40.4% of the total, come from families with a monthly income below RM1500. The next largest group, accounting for 26.3% of the students, are from families with incomes

above RM5500. Students from families earning between RM1500 and RM3500 represent 17.5% of the total, while those from families earning between RM3500 and RM5500 make up 15.8%.

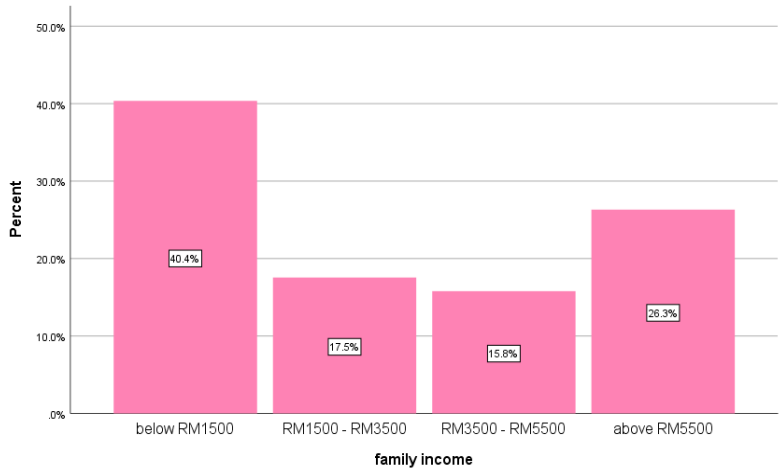

Figure 3: Bar chart for respondents' family income

The study's measurement items for all variables were evaluated for internal consistency using Cronbach's Alpha, with values exceeding 0.80 as shown in Table 2. According to Hinton, P. R. et al. (2004), a Cronbach's Alpha value above 0.50 suggests moderate reliability, while a value of 0.70 and higher indicates high reliability for both dependent and independent variables. Hence, the obtained Cronbach's Alpha values signify that the survey constructs demonstrate consistent and reliable measurement. This indicates that the variables used in the study are dependable and suitable for further analysis and interpretation.

Table 2: Cronbach's Alpha value

Variable	Cronbach's Alpha	No of Items	Result
Spending Habits	0.896	5	high reliability
Financial Literacy	0.845	5	high reliability

Correlation Analysis

A correlation analysis becomes useful to explore the associative relationship between independent and dependent variables. Scatter plot is used to determine whether or not two variables have a relationship. Based on scatter plot in figure 4, the results revealed that there is a positive relationship between financial literacy and spending habits. Higher financial literacy is positively correlated with more responsible spending habits among university students. This association suggests that students are more likely to budget well, refrain from making impulsive purchases, manage their debt sensibly, and participate in long-term financial planning if they comprehend financial concepts like saving, debt management, and budgeting. Through the advancement of financial literacy, educators and

policymakers can equip students to make well-informed financial decisions that will enhance their overall financial security in the now and the future.

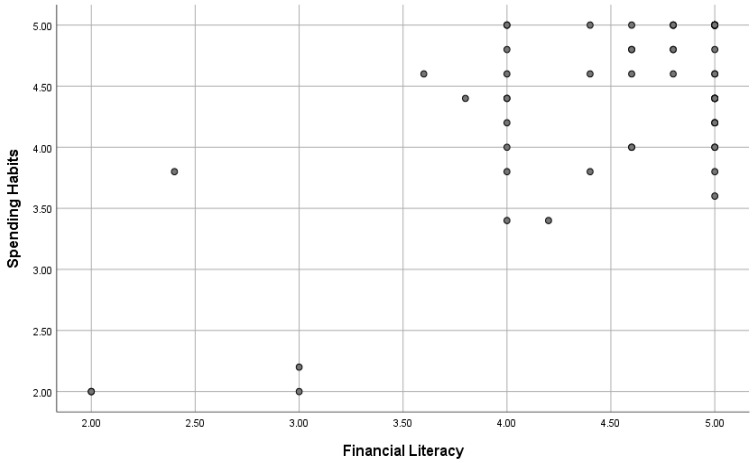

Figure 4: Scatter plot Financial Literacy versus Spending Habits

The Pearson correlation coefficient, denoted by R, measures the strength and direction of the linear relationship between two variables. Based on table 3, the correlation coefficient between financial literacy and spending habits is 0.697. indicating a strong positive correlation. The p-value associated with this correlation is 0.000, less than 0.05, which suggests that the correlation is statistically significant at significance levels (α=0.05).

According to this result, students are more likely to demonstrate responsible spending habits the more financially literate they are. Having sufficient financial knowledge is especially important for university students who frequently manage limited funds to efficiently manage their financial commitments. Enhancing their financial literacy will help students make more educated judgements about their spending since they will be able to comprehend ideas like debt management, budgeting, and saving. This correlation emphasises how crucial it is to include financial education programmes in university curriculum to give students the knowledge and abilities needed for responsible financial management and to put them on the path to financial well-being both during and after their academic careers.

Table 3: Summary of Correlation Analysis.

	Pearson Correlation Coefficient, R	p-value
Financial Literacy vs Spending Habits	0.697**	0.000

Table 4: Model summary

Model	R	R Square	Std. Error of the estimates
1	0.697	0.486	0.56268

Predictors: (Constant), Financial Literacy

Table 4 showed the model summary for financial literacy and spending habits among students. The R^2 value is 0.486 suggests that financial literacy can account for about 48.6% of the variation in university students' spending habits. This suggests that financial literacy is important for understanding and forecasting spending habits, as it accounts for a considerable percentage of the variation observed in these behaviours. Other variables not included by the analysis, such as personal preferences, socioeconomic status, or outside influences, may be responsible for the remaining heterogeneity.

Conclusion

According to the finding, there is a positive correlation between UiTM students' spending habits and financial literacy, meaning that when students learn more about money, they are more likely to make wise financial decisions. This result emphasizes how crucial it is to include financial education into UiTM's curriculum in order to give students the tools they need to manage their money wisely. Through the improvement of financial literacy, UiTM can enable students to make well-informed financial decisions that will further their overall financial well-being both during and after their academic careers.

Thus, it is recommended that future scholars delve deeper into the ideas and concepts included in this work. Because a range of factors might influence a student's spending habits, researchers looking to study students' spending habits should include additional independent variables in their research.

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A SUCCESSFUL INTERVENTION PROGRAM FOR ENGINEERING STUDENTS

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ABSTRACT

Further Differential Equations (MAT480) is a critical math course at the College of Engineering, Civil Engineering Studies, UiTM Cawangan Pulau Pinang. Unfortunately, during the October 2022-February 2023 semester, 30% of students failed this course. To address this, the "Boost Up Your Mathematical Skills Workshop (BMS)" was implemented for the March-August 2023 semester. The workshop sought to improve students' mathematical skills and boost students' confidence in the subject. In the March-August 2023 semester, 91% of students successfully passed the course, indicating improved outcomes. In order to sustain this positive trend, the intervention program was implemented for the second time for students during the October 2023 – February 2024 semester, involving 26 students and two lecturers as facilitators. In this article, the studies aim to analyse the result of the pretest and posttest to forecast the student's achievement in their final examination. If the forecast proves to be correct, then BMS will continue into upcoming semesters, enabling early performance assessment. Additional programs to raise performance can be implemented if the prognosis indicates a decline in student performance.

Keywords: further differential equations, engineering students, intervention program, mathematical skills, academic performance.

Introduction

The Further Differential Equations (MAT480) course is one of the crucial mathematics components for undergraduates in the Civil Engineering Studies at the College of Engineering, Universiti Teknologi MARA (UiTM), Cawangan Pulau Pinang. However, a notable concern emerged in the semester of October 2022–February 2023, with 30% of students facing challenges in succeeding (Kechil et al., 2023). To address this, the "Boost Up Your Mathematical Skills Workshop (BMS)" intervention program was introduced, influenced by the progress of Open Distance Learning (ODL) during the COVID-19 pandemic, as discussed by Kechil et al. (2020), Wan Mohammad et al. (2020), Mohd Mydin et al. (2020) and Abd Rahman et al. (2023). This BMS aimed to enhance students' mathematical skills through a comprehensive approach, resulting in improved academic performance, particularly in the MAT480 course. Notably, 91% of students successfully passed their final examinations in the March–August 2023 semester. Inspired by this achievement, the intervention program continued in an effort to improve student performance for the October 2023–February 2024 semester.

Literature Review

Generations Y and Z widely embrace computer technology and telecommunications (Wan Mohammad et al., 2017). Given the contemporary generation's proficiency and interest in the Internet of Things (IoT), traditional face-to-face learning becomes less pertinent (Aithal & Aithal, 2016). Consequently, a transition to blended learning is more fitting. To aid university students in their ongoing preparation throughout the course, the implementation of blended learning interventions is recommended. Additionally, the research done by Silvia et al. (2020) suggests that digital-based interventions have a positive impact on the mathematics achievement of students with mathematical difficulties. According to Higgins et al. (2019), technology interventions had a significant and favourable impact on students' mathematical achievement.

The use of video as a learning tool in blended learning environment is widely discussed by many researchers because it can create enthusiasm for learning (Kamariah, 2018), foster deeper learning (Mitra el al., 2010), and improve attitudes towards learning (Kinnari-Korpela, 2015; Rahmadani & Nurlaelah, 2019; Tan ed al., 2020). For instance, Kinnari discovered that students were motivated to learn mathematics when brief video lectures were used. Due to the video’s step-by-step solutions and explanations, they were able to better internalise and comprehend the mathematics material. Nevertheless, relying solely on technology for independent student study is inadequate. Merely watching videos without two-way communication should be discouraged. Prolonged solitary video viewing may lead to challenges in physiology, communication, and social skills for students (Kechil et al., 2021; Abdul Razak et al., 2021; Kechil et al., 2022).

Engaging in group discussions with peers is crucial to foster the enhancement of social and communication skills (Chung et al., 2016; Samter, 2003). The facilitator serves as a guide, ensuring that students stay on the correct path when comprehending each discussed topic (Hmelo-Silver & Barrows, 2006). This is also supported by group work, which allows learners to think analytically and critically, enhances their teamwork sprit, and fosters independent learning (Sofroniou & Poutos, 2016). Leveraging both peers and facilitators enables students to swiftly enhance their understanding of a variety of subjects, facilitated by their proficiency in self-directed learning with digital technology (Song, 2021).

Methodology

This intervention program ran for the first time in the March-August 2023 semester with the aim of enhancing engineering students' math skills for success in MAT480. It is divided into three weeks. Topics covered include differentiation, integration techniques, nonpolynomial vs. polynomial, series

and graph sketching. These topics correspond to the foundational areas of students' early calculus education. It was necessary for the students to recall all the fundamental mathematical concepts, rules, and procedures because they had forgotten the topics.

The intervention program, as depicted in Figure 1, involves three key components: self-monitoring studies, peers, and facilitators. Combining these elements is essential for success, especially in mathematics education. Self-monitoring studies empower students to take charge of their learning and cultivate self-directed skills. Peers contribute crucial support, encouragement and feedback, while facilitators, like instructors and tutors, act as guides and mentors for students.

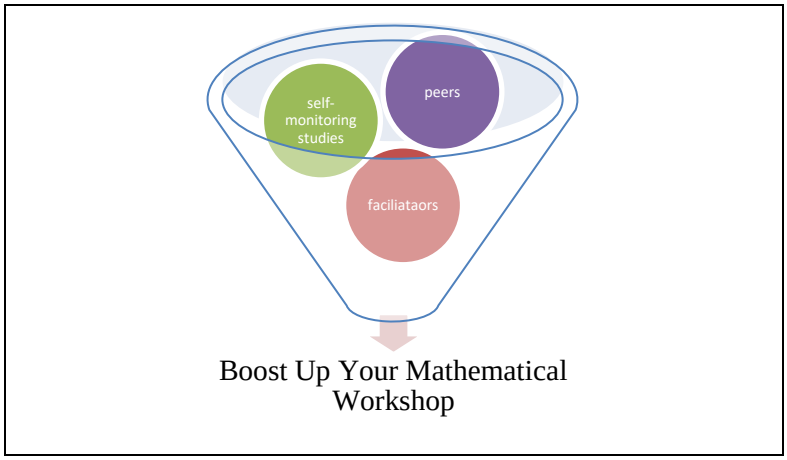

Figure 1: Three main elements in the intervention program

The success of this intervention is reflected in the results of the final exams of students, where 91% of students passed the MAT480 subject in the March-August 2023 semester. Therefore, this semester, this intervention program is being carried out for the second time. A total of 26 students from the October 2023-February 2024 semester were involved. Two lecturers with about 20 years of experience in the field of teaching mathematics for the subject of mathematical engineering were involved as facilitators.

The Figure 2 flowchart illustrates the intervention process. In the first week, students took a pretest to evaluate their understanding of prior topics, focusing on MAT480 relevance. In the second week, they watched instructional videos and engaged in group discussions. Students presented solutions to peers and facilitators in the final part of the second week, promoting two-way learning. The third week concluded with students taking a posttest to assess their progress in the program.

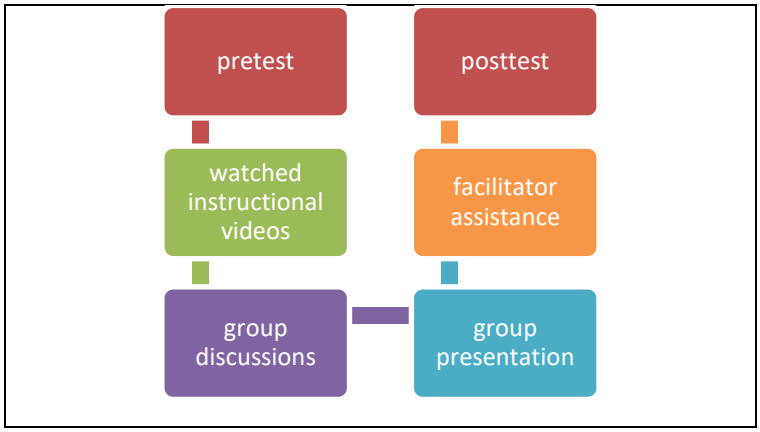

Figure 2: Flowchart of the intervention process

Result and Discussion

The data indicating an improved posttest score aligns with the high success rate of 91% in the final examination for the March-August 2023 semester. The positive trend in posttest scores reflects the effectiveness of the intervention program in enhancing students' mathematical skills. The majority of students scoring above 50% in the posttest experienced further improvement, contributing to the significant pass rate in the final examination. This suggests a correlation between the intervention program's impact on students' proficiency and their overall success in the MAT480 course, emphasizing the program's role in achieving favorable academic outcomes.

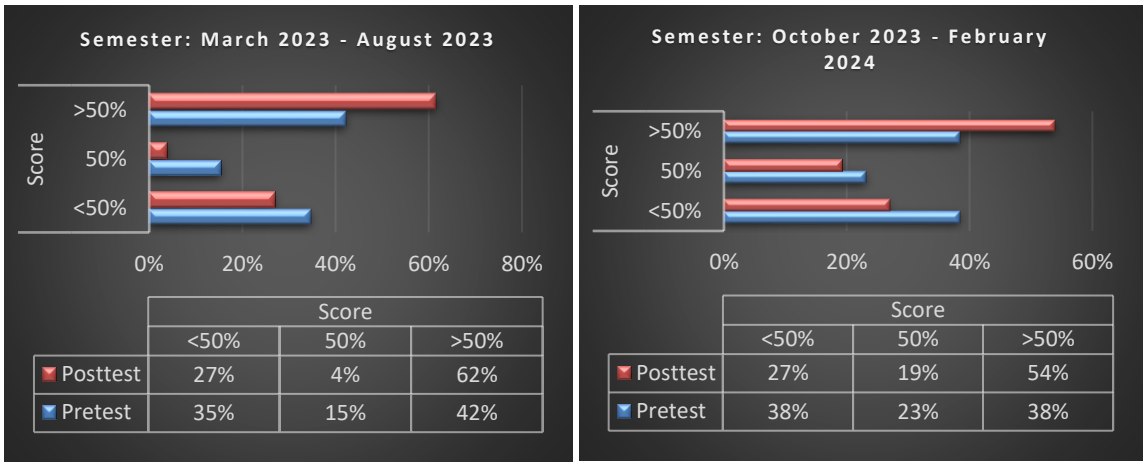

Figure 3: Score of pretest and posttest

Building upon the insights from the intervention program data in the March-August 2023 semester, the forecast for the October 2023-February 2024 semester is optimistic. In the pretest, 38% of students initially scored below 50%, suggesting a similar challenge as observed in the previous

semester. However, the positive trend seen in the March-August 2023 data, where posttest scores improved significantly, indicates potential improvement in the upcoming semester as well.

Similar to the March-August 2023 data, the majority of students with pretest scores above 50% in the October 2023-February 2024 semester are expected to experience improvement. The percentage of students scoring above 50% is forecast to rise from 38% in the pretest to 54% in the posttest, reflecting the effectiveness of the intervention program in enhancing mathematical skills.

Comparing both semesters, the forecast suggests a consistent positive impact on students' proficiency. The lessons learned from the March-August 2023 intervention program, especially in addressing challenges for students scoring below 50%, can be applied to further optimize outcomes in the upcoming semester. The parallel increase in posttest scores and the pass rate in the final examination observed in the March-August 2023 semester serves as a promising indicator for continued success in achieving favorable academic outcomes in the October 2023-February 2024 semester.

Conclusion

The BMS aimed to enhance students' mathematical abilities and boost their confidence as they progressed through the MAT480 course. The comprehensive three-week intervention program and its potential for improving the mathematical skills and overall academic performance of engineering students in MAT480 show the improvement of the students' results in their final examination. 91% of the students pass their final examination in the March–August 2023 examination. We anticipate the continuation of success for this intervention program into the October 2023– February 2024 semester, with students excelling in their academic endeavors during this period.

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TEKNIK MENGHAFAZ AL QURAN

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ABSTRACT

Pengajian hafazan Al-Quran adalah satu bidang ilmu yang sangat penting di kalangan masyarakat Islam pada masa kini. Ilmu ini seharusnya diterapkan kepada setiap individu yang beragama Islam sejak dari kecil lagi. Kewujudan pusat-pusat tahfiz yang semakin berkembang kini membuktikan bahawa kesedaran dan kemahuan ibubapa itu sendiri terhadap pengajian Al-Quran terhadap anak-anak mereka. Pusat-pusat tahfiz ini berperanan dalam mengajar teknik yang betul dalam menghafaz Al-Quran. Di samping itu ia turut menekankan terhadap bacaan, tajwid, pemahaman dan hafazan Al-Quran itu sendiri. Teknik yang betul ini sangat penting dalam membentuk pola bacaan dan tertib hafazan dengan baik. Dengan teknik yang betul ini juga, pelajar dapat menghabiskan bacaan dengan cepat dan sempurna. Kajian ini dijalankan berdasarkan pemerhatian dari kajian yang lepas terhadap teknik yang betul dalam hafazan bagi memudahkan setiap penghafaz Al-Quran dalam menghabiskan 30 juzuk Al-Quran. Diharapkan kajian ini memberi satu titik tolak kepada setiap individu yang beragama Islam dalam berusaha menhafaz Al-Quran tanpa mengira usia.

Keywords: hafazan, teknik, bacaan, tahfiz, Al-Quran

Pendahuluan

Membaca Al-Quran adalah dituntut dalam agama Islam dan ia sangat penting dalam kehidupan seorang Muslim. Al-Quran merupakan kitab suci umat Islam yang diturunkan kepada Nabi Muhammad SAW sebagai panduan hidup bagi seluruh umat Islam. Al-Quran adalah kitab yang kaya dengan sumber ilmu. Didalamnya terkandung semua ilmu dan pengetahuan tentang agama, sains, sosial, sejarah dan banyak lagi. Al-Quran satu keajaiban yang Allah turunkan kepada seluruh umat manusia yang mampu menyelesaikan masalah manusia. Dengan membacanya sahaja hati akan akan menjadi tenang. Ini kerana didalamnya terdapat pelbagai ayat yang boleh dijadikan syifa yang dapat menenangkan perasaan dan menyelesaikan masalah yang setiap manusia hadapi. Jadi setiap umat Islam harus yakin dan percaya dengan kitab yang satu ini. Oleh yang demikian dengan kehebatan kitab Al-Quran ini semakin ramai individu yang beragama Islam berlumba-lumba untuk berusaha mendalami ilmu Al-Quran. Tanpa mengira pangkat dan usia setiap dari kita yang beragama Islam seharusnya berusaha menempatkan diri dengan kumpulan yang berusaha untuk menghafaz Al-Quran. Dengan usaha yang sedikit ini kita harapkan supaya Allah SWT memandang setiap dari hambanya dengan rasa kasih dan sayangNya.

Kemungkinan besar dari kita sedang menghafaz Al-Quran namun tidak berjaya. Ini adalah disebabkan beberapa faktor yang membuatkan seorang yang mengahafaz Al-Quran tidak berjaya menghafaz. Antaranya adalah tiada minat dan kemahuan dengan sendirinya. Kemungkinan seseorang itu terpaksa atau dipaksa oleh ibubapa untuk menghafaz. Ini kerana seseorang itu perlulah ada niat yang betul sebelum menghafaz Al-Quran supaya setiap ayat yang dihafal dapat dicapai dengan baik dan sempurna. Azmil Hashim, et al. (2013) menyatakan bahawa antara faktor yang menjadi punca kelemahan dalam kaedah pengajaran dan pembelajaran tahfiz ialah pengajar masih mengekalkan kaedah tradisional dalam proses pengajaran dan pembelajaran tahfiz. Walaupun begitu mereka menyokong sepenuhnya bahawa penggunaan teknologi membantu dalam meningkatkan mutu hafazan al-Quran (Mohamad Marzuqi, 2008).

Setiap individu yang menghafal juga perlu tanamkan keyakinan yang tinggi dan berfikiran positif bahawa mengahafal Al-Quran ini sangat dituntut dan berazam untuk menjadi seorang huffaz yang berjaya dan dapat memberi manfaat kepada orang lain. Kebanyakan penghafaz juga kemungkinan mempunyai keinginann yang begitu tinggi untuk menghafal tetapi tidak tahu teknik yang betul dalam menghafal Al-Quran. Oleh yang demikian, kajian ini dijalankan dalam mengenalpasti teknik yang betul dan mudah untuk setiap dari kita yang beragama Islam gunakan dalam memulakan proses menghafal Al-Quran.

Teknik Menghafaz Al-Quran

1. Tetapkan niat

Setiap satu amalan yang kita lakukan setiap hari sudah pastinya dengan niat. Dengan niat yang betul dan bersungguh-sungguh barulah akan ada tindakan untuk menghafaz Al-Quran. Setiap umat Islam perlu tahu yang menghafal Al-Quran adalah ibadah yang sangat terpuji. Oleh yang demikian tanamkan niat menghafal itu kerana Allah dan lakukanlah ia dengan hati yang ikhlas.

2. Mulakan sekarang

Menghafal Al-Quran adalah satu ibadah yang sangat mulia yang tidak seharusnya ditunda-tunda. Semakin awal kita memulakan langkah untuk menghafal semakin cepat kita akan selesai menghafal Al-Quran dan semakin cepat kita akan mendapat hasilnya. Sudah pasti menghafal Al-Quran itu bukanlah sesuatu yang mudah dan ia memakan tempoh masa yang panjang namun jika masa itu sudah berlalu, semuanya akan rasa sebentar sahaja malah akan merasai kenikmatan dan kemanisan dari setiap hafalan itu.

Terdapat beberapa cara dalam memulakan hafalan Al-Quran. Antaranya adalah:

i. Bermula dari surah-surah yang lazim iaitu dari juzuk 30. Kemudiannya berpindah ke juzuk 29. Setetusnya barulah bermula dari juzuk 1 hingga juzuk 28. Kebanyakan penghafal

menggunakan cara ini. Ini kerana kebanyakan dari kita sudah biasa dengan surah lazim dan mudah ingat dengan surah yang pendek. Momentum yang sudah ada itu boleh memudahkan seseorang itu untuk menghafal surah seterusnya yang lebih panjang.

ii. Mengikut turutan dari juzuk 1 hingga juzuk 30. Supaya seseorang itu tidak cepat merasa penat dalam menghafal dari surah yang panjang, mulai dahulu dengan menghafal sedikit demi sedikit contohnya bermula dengan tiga baris ayat dahulu. Sekiranya sudah biasa tambahkan ayat hafalan sedikit demi sedikit setiap hari.

iii. Bermula dengan juzuk 30 yang mengandungi surah-surah lazim. Seterusnya berpindah ke surah-surah yang panjang yang biasa didengar contohnya surah Yasin, surah Al-Mulk, As-Sajadah, Al-Waqiah, An-Naba atau surah-surah lain dan barulah bermula dengan juzuk 1.

3. Letakkan ‘target’ tempoh masa yang jelas

Dengan adanya tarikh akhir untuk kita menghabiskan 30 juzuk itu barulah seseorang itu mempunyai matlamat yang jelas. Dengan matlamat yang jelas seseorang akan memulakan tindakan tanpa menunda-nunda. Berapa lama seseorang itu dapat menghabiskan hafalan adalah bergantung kepada berapa konsisten seseorang itu dapat menghafal setiap hari. Ada yang dapat menghafal dalam tempoh 1 tahun, 3 tahun dan juga 5 tahun atau lebih. Selepas mempunyai tempoh akhir yang jelas, pecahkan kepada bahagian-bahagian yang kecil. Contohnya seminggu satu halaman, Sabtu dan Ahad fokuskan untuk mengulang hafazan atau sehari menghafal 3 baris ayat.

4. Menghafal waktu pagi

Pad awal pagi, fikiran kita masih kosong. Oleh itu ayat-ayat Al-Quran lebih mudah masuk kedalam minda seseorang itu. Berusaha menghafal pada waktu sebelum subuh kerana waktu itu penuh dengan keberkatan.

5. Berguru

Carilah guru dalam usaha untuk menghafal Al-Quran kerana guru dapat membetulkan jika kita salah dalam bacaan hafalan dan dapat mengajar tajwid dengan betul. Tidak perlu untuk berjumpa guru setiap hari jika masa tidak mengizinkan. Kemungkinan sebulan sekali untuk guru tersebut menyemak hafalan kita dan memberi motivasi untuk seseorang itu meneruskan bacaan.

6. Gunakan 1 Mushaf

Pilihlah satu mushaf dan gunakanlah ia sehingga ke akhirnya. Ini kerana apabila kita menghafal, imej halaman mushaf itu akan terpapar dalam minda.

7. Ulang hafalan setiap hari

Mengulang hafalan ini adalah sangat penting. Jika kita leka dalam menghafal dan tidak konsisten setiap hari sesorang itu akan mudah lupa dan terpaksa memulakan usaha semula dalam menghafal Al-Quran. Zakaria dan Samah (2022), menyatakan bahawa kuatnya hafazan seorang itu dapat dilihat dari kebolehan seseorang itu mengulang semula hafazan itu terlebih dahulu dan menulis semula ayat Al-Quran itu tanpa melihat mushaf.

8. Dengar bacaan Al-Quran

Ada waktunya mungkin kita tidak dapat membaca Al-Quran, kemungkinan kerana keuzuran atau sakit tekak dan lain-lain. Oleh itu, tukarlah aktiviti itu dengan mendengar bacaan Al-Quran. Mendengar adalah satu proses yang menggunakan deria telinga sebagai unsur auditori dan merupakan teknik pembelajaran yang kerap digunakan oleh pelajar dalam proses menghafal Al-Quran (Mustafa et al., 2018). Kini, terdapat banyak aplikasi Al-Quran yang boleh kita 'download' di dalam telefon pintar. Jadi kita dapat mainkan bacaan berulang-ulang kali. Menurut Buzdar dan Farooq (2020), penggunaan aplikasi digital dalam telefon bimbit membantu seseorang dalam proses mendengar dan menghafal Al-Quran mengikut masa mereka sendiri.

Kesimpulan

Menghafaz Al-Quran bukanlah satu proses yang mudah. Seseorang itu perlukan keyakinan yang tinggi dan sistem sokongan yang kuat dari orang disekelilingnya. Dengan teknik yang betul semoga dapat memudahkan seseorang itu dalam menghafal Al-Quran. Tapi percayalah dengan niat yang ikhlas itu Allah akan membantu memudahkan seseorang itu dalam menghafal Al-Quran dan pastinya akan merasai kemanisan pada penghujungnya. Sesungguhnya membaca, menghayati dan menghafal ayat-ayat Al-Quran akan menghidupkan hati-hati manusia seperti mana air hujan yang menyuburkan dan menghidupkan tanaman.

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KESILAPAN DALAM LANGKAH PENYELESAIAN LOGARITMA

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ABSTRAK

Pelajar-pelajar sering menghadapi cabaran dalam menyelesaikan langkah kerja logaritma, di mana kesilapan-kesilapan tertentu sering kali muncul semasa mengaplikasikan langkah-langkah penyelesaian. Salah satu kesilapan umum yang sering ditemui adalah keliru dalam mengenal pasti peraturan-peraturan logaritma asas, seperti hukum logaritma, yang boleh menyebabkan kesilapan dalam mempermudahkan persamaan logaritma. Selain itu, pelajar juga cenderung keliru dalam menukar antara bentuk logaritma dan bentuk eksponen, yang boleh memberi impak besar terhadap kefahaman terhadap soalan yang diberikan. Kajian kes ini melibatkan seramai 29 orang pelajar yang mengambil subjek asas matematik di peringkat pra-diploma perdagangan. Data yang diambil ini merupakan markah bagi ujian yang merangkumi topik logaritma. Berdasarkan analisa deskriptif, didapati min markah keselruhan yang diperolehi adalah agak rendah iaitu sebanyak 57.9%. Secara tidak langsung ini menggambarkan terdapat banyak kesilapan semasa melakukan jalan kerja bagi topik logaritma. Kajian ini diharap dapat membantu pendidik untuk memberi panduan kepada pelajar-pelajar akan datang bagi mengatasi kesilapan yang berulang dan memperbaiki konsep-konsep logaritma secara lebih efektif.

Kata Kunci: Logaritma, eksponen, matematik, analisa deskriptif, pra-diploma perdagangan

Pengenalan

Dalam dunia matematik, penggunaan logaritma merupakan suatu cabaran yang seringkali menyebabkan kesilapan dalam penyelesaian. Para pendidik perlu mengenal pasti dan memahami sumber kesilapan yang biasa berlaku semasa menjalankan pengiraan logaritma. Di antara fokus utama yang perlu diambilkira adalah pada pemahaman yang kurang tepat terhadap hukum logaritma. Dengan mengenalpasti kesilapan ini secara lebih mendalam, para pendidik berharap dapat meningkatkan kemahiran dan ketepatan penggunaan logaritma dalam pelbagai situasi matematik dan sains. Logaritma merupakan konsep matematik yang penting dan kerap digunakan dalam pelbagai bidang ilmu dari matematik tulen hingga aplikasi praktikal dalam sains dan teknologi. Walaupun logaritma dianggap sebagai topik yang asas, ramai pelajar sering membuat kesilapan yang boleh mempengaruhi pemahaman dan penggunaannya.

Pelbagai kesilapan konseptual dapat dikenal pasti dalam pemahaman logaritma. Contohnya, beberapa individu mungkin tidak memahami konsep asas logaritma secara menyeluruh. Selain itu, terdapat kesilapan dalam mengenali harta logaritma seperti hukum logaritma. Kesulitan juga timbul dalam memahami hubungan antara logaritma dan eksponen. Dalam menyelesaikan persamaan

logaritma, beberapa kesilapan sering berlaku. Individu mungkin mengabaikan langkah-langkah penting dalam menyelesaikan persamaan tersebut. Terdapat juga kesalahan umum yang melibatkan ketidaksedaran akan kemungkinan adanya penyelesaian kompleks pada persamaan logaritma. Selain itu, kesilapan lazim dapat dikenal pasti dalam menyederhanakan bentuk persamaan logaritma.

Dalam penggunaan logaritma untuk menyelesaikan masalah, kesilapan seringkali muncul. Beberapa pelajar mungkin mengalami kesukaran dalam mengenalpasti bila logaritma sepatutnya digunakan dalam menyelesaikan masalah. Selain itu, terdapat kesilapan dalam mentafsirkan hasil logaritma dalam konteks masalah nyata. Pelajar juga mungkin menghadapi kesukaran dalam mengubah jawapan ke bentuk logaritma atau sebaliknya. Penggunaan kalkulator logaritma juga melibatkan beberapa kesilapan di mana pelajar mungkin tidak menguasai fungsi logaritma pada kalkulator. Kesilapan sering berlaku dalam menentukan asas logaritma pada kalkulator. Selain itu, terdapat kesilapan teknikal dalam memasukkan persamaan logaritma ke dalam kalkulator.

Kajian terdahulu telah menerokai pelbagai kesilapan yang mungkin berlaku semasa menggunakan logaritma. Beberapa penyelidikan menekankan kesilapan dalam pemahaman konsep logaritma, terutamanya berkaitan dengan nilai logaritma yang negatif dan kesukaran dalam menangani asas logaritma yang melibatkan bilangan kompleks. Tambahan pula, terdapat penumpuan pada strategi pengajaran yang membantu mengatasi kesilapan, seperti pendekatan berpandukan masalah dan pembelajaran yang melibatkan aktiviti.

Berdasarkan Tian, Puri dan Yoppy (2017), hasil dapatan kajian menemui bahawa pelajar tidak memahami konsep asas logaritma dan juga terdapat banyak kesilapan dari segi aritmetik iaitu melibatkan operasi tambah, tolak, darab dan bahagi. Kajian Halim (2020) pula mendapati pelajar kurang memahami konsep asas hukum logaritma. Pemahaman pelajar berkaitan konsep asas hukum logaritma agak berbeza menyebabkan kesilapan dalam jalan kerja logaritma. Kedua-dua kajian ini menemui dapatan yang sama iaitu pelajar kurang memahami konsep asas logaritma.

Menurut Rafi dan Retnawati (2018), hasil kajian mereka menunjukkan bahawa pelajar agak cuai dalam mengira atau memanipulasi operasi algebra seterusnya menyebabkan jawapan yang tepat tidak perolehi. Pelajar ini juga seringkali menganggap "log" sebagai pembolehubah. Berdasarkan kajian ini juga, pelajar kurang menguasai konsep eksponen dan logaritma di mana majoriti pelajar membuat kesilapan yang tinggi pada kesilapan teknikal. Kesilapan teknikal ini termasuklah kesalahan dalam pengiraan kerana kecuaian, kesalahan dalam memanipulasi operasi algebra dan kesalahan dalam menggunakan algoritma.

Sitti, Hafiluddin dan Latief (2017) mendapati bahawa jenis kesilapan yang dilakukan oleh pelajar dalam menyelesaikan masalah eksponen dan logaritma termasuklah kesilapan fakta, konsep, prinsip dan prosedur. Kajian ini bukan sahaja mengenalpasti jenis kesilapan namun ianya juga mengenalpasti faktor-faktor yang menyebabkan kesilapan dalam menyelesaikan masalah eksponen dan

logaritma. Di antaranya ialah motivasi pelajar rendah, pelajar tidak dapat membangunkan langkah-langkah yang sistematik dalam menyelesaikan masalah eksponen serta logaritma dan ketidaktepatan pelajar dalam menyelesaikan masalah.

Berdasarkan hasil kajian Desnani dan Kartini (2021), didapati masih ramai pelajar yang melakukan kesilapan dalam menyelesaikan masalah matematik. Jenis kesalahan yang dilakukan oleh pelajar ialah kesilapan konsep. Kesilapan konsep yang dilakukan oleh pelajar ialah kesilapan dalam menggunakan sifat logaritma untuk menyelesaikan masalah matematik. seterusnya, Kesilapan prosedur. Kesilapan prosedur yang dilakukan oleh pelajar ialah kesilapan dalam langkah atau algoritma untuk menyelesaikan masalah matematik. Kesilapan teknikal juga dilakukan, iaitu kesilapan pelajar dalam menentukan keputusan akhir, dan kesilapan dalam menjalankan operasi pengiraan dalam persamaan.

Berdasarkan kajian Ong dan Novisita (2019) pula mendapati kesilapan yang dilakukan oleh pelajar adalah kerana pelajar tidak memahami soalan, tidak memahami konsep material seperti sifat-sifat logaritma, tidak menggunakan semua data dalam soalan dan kadangkala terlepas data penting, tidak tepat dan cuai dalam langkah kerja. Sebagai contoh, dalam kes pendaraban logaritma, terdapat pelajar yang melakukannya secara langsung tanpa menggunakan kaedah dan tidak meletakkan tanda tolak dan ini mengakibatkan kesilapan pada jawapan. Terdapat juga pelajar yang tidak faham sifat logaritma yang hendak digunakan dan juga kesilapan dalam menggunakan sifat logaritma kerana tidak menghafal sifat logaritma.

Dalam kajian ini, penyelidik mensasarkan untuk mengenalpasti kesalahan yang kerap dilakukan oleh para pelajar dalam penyelesaian logaritma. Topik logaritma merupakan antara topik yang agak sukar diselesaikan apabila ditanya kepada para pelajar. Sekiranya kesalahan dalam topik logaritma yang dikenalpasti ini diketahui, pendidik perlu mengatasinya dengan menggunakan kaedah yang bersesuaian agar kesalahan begini dapat diperbetulkan.

Metodologi

Kajian kes ini melibatkan seramai 29 orang pelajar pra diploma perdagangan. Markah min bagi ujian topik logaritma diambil untuk melihat prestasi pelajar. Terdapat tiga soalan berkaitan logaritma yang diuji dalam ujian tersebut. Sebanyak 7 markah diperuntukkan bagi ketiga-tiga soalan iaitu soalan pertama sebanyak 3 markah manakala soalan kedua dan ketiga masing-masingnya sebanyak 2 markah.

Jadual 1 berikut mengandungi soalan yang ditanya dalam ujian topik logaritma. Soalan yang diuji menggabungkan beberapa hukum dan konsep asas logaritma. Di antara hukum yang akan digunakan ialah Hukum Logaritma Darab, Hukum Logaritma Bahagi dan juga Hukum Logaritma Kuasa. Secara tidak langsung, soalan yang diuji ada menggunakan sifat-sifat asas logaritma. Soalan berkaitan persamaan logaritma juga diuji di mana soalan ini perlu ditukar dari bentuk logaritma kepada

bentuk indeks. Terdapat juga soalan yang menggunakan kaedah logaritma untuk menyelesaikan persamaan yang diberikan dalam bentuk indeks.

Jadual 1: Soalan bagi Ujian Topik Logaritma

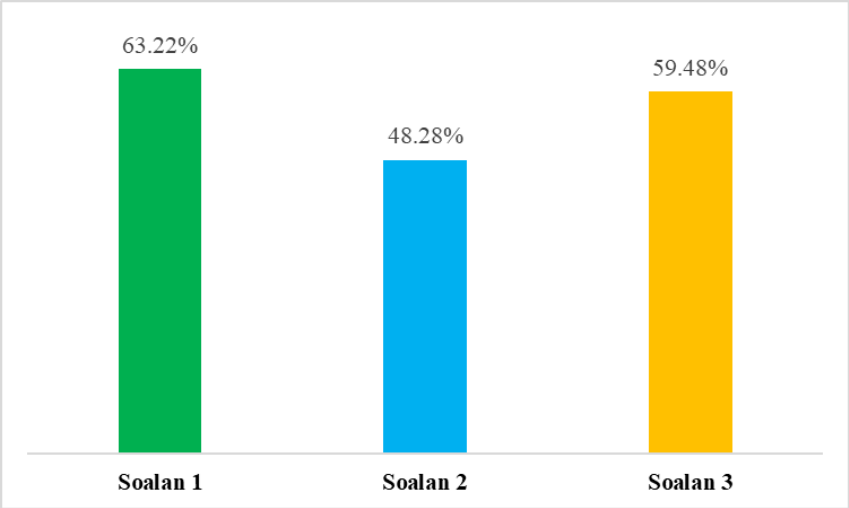
Soalan	Bentuk Soalan
Soalan 1	Nyatakan 2log x – 3logy +2 - log10x di dalam ungkapan logaritma tunggal
Soalan 2	Cari nilai x sekiranya log (4x + 5) + log 4 = 2 log 10
Soalan 3	Cari nilai x sekiranya $2^{2+x} = 6$

Skrip jawapan pelajar akan disemak satu persatu bagi mengenalpasti jenis-jenis kesalahan yang kerap dilakukan oleh pelajar bagi topik logaritma yang diuji dalam ujian ini.

Analisa dan Perbincangan

Berdasarkan markah min pelajar bagi setiap soalan yang ditunjukkan dalam Rajah 1, didapati bahawa prestasi bagi topik logaritma kurang memuaskan terutamanya bagi soalan 2 yang mempunyai min markah sebanyak 48.28% sahaja. Soalan 3 pula mempunyai min markah yang agak sederhana iaitu sebanyak 59.48%. Begitu juga bagi soalan 1 yang mempunyai min markah yang sederhana iaitu sebanyak 63.22%.

Bagi soalan 1, majoriti pelajar kurang mahir dalam mengaplikasikan Hukum Logaritma Darab [log a + log b = log ab] dan juga Hukum Logaritma Bahagi [log a – log b = log a/b]. Bagi soalan 2 pula, pelajar perlu menggabungkan beberapa hukum logaritma dan persamaan iaitu dengan mengaplikasikan Hukum Logaritma Darab dan Hukum Logaritma Kuasa. Pelajar juga perlu menyamakan argumen logaritma dan seterusnya menyelesaikan persamaan untuk mendapatkan nilai x. Namun begitu, kebanyakan pelajar tidak menguasai konsep hukum logaritma sepenuhnya dan ini menyebabkan kesilapan dalam penyelesaian soalan logaritma. Pelajar yang tidak dapat menjawab soalan 3 rata-ratanya tidak menggunakan kaedah logaritma untuk menyelesaikan persamaan yang asalnya diberi dalam bentuk indeks. Pelajar tersebut tidak tahu cara menyelesaikan persamaan tersebut kemungkinan besar kurangnya latih tubi dalam subtopik tersebut. Melalui pemerhatian kertas jawapan pelajar, terdapat juga beberapa pelajar yang tidak menghafal hukum logaritma dan sifat asas logaritma. Ini menyebabkan pelajar tersebut tidak dapat menyelesaikan soalan yang berkaitan logaritma.



Rajah 1: Min Markah Pelajar

Kesimpulan

Berdasarkan analisa dan perbincangan, dapat disimpulkan bahawa pelajar kerap melakukan kesalahan soalan logaritma terutamanya apabila soalan tersebut melibatkan gabungan pelbagai hukum logaritma seperti Hukum Logaritma Darab, Bahagi, dan Kuasa serta beberapa sifat-sifat asas logaritma. Pelajar juga didapati membuat kesalahan apabila soalan tersebut melibatkan persamaan indeks yang perlu menggunakan kaedah logaritma. Terdapat sesetengah pelajar yang tidak menghafal hukum dan sifat asas logaritma.

Dengan mengenal pasti dan menganalisis kesilapan-kesilapan lazim yang kerap berlaku dalam pemahaman dan penggunaan logaritma. Pemahaman yang kukuh terhadap logaritma menjadi kunci kejayaan dalam menyelesaikan masalah matematik dan aplikasinya dalam pelbagai bidang ilmu. Dalam mengkaji kesalahan yang sering muncul dalam penyelesaian soalan logaritma, dapat disimpulkan bahawa pemahaman konsep logaritma serta kemahiran dalam menangani persamaan logaritma merupakan aspek-aspek penting. Kesedaran terhadap kesalahan-kesalahan ini diharapkan dapat meningkatkan kemahiran pelajar dan pendidik matematik dalam mengaplikasikan logaritma secara efektif dalam menyelesaikan masalah. Artikel ini diharapkan dapat memberikan panduan dan rujukan kepada pendidik dan pelajar.

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THE FRAMEWORK OF INVENTORY PREDICTION MODEL USING ABC ANALYSIS FOR INVENTORY MANAGEMENT

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ABSTRACT

In the present day, there exist technologies that aid in forecasting the future. This is particularly beneficial in the business sector, where business intelligence technology is widely utilized for business development. Business analysis is a method that contributes to the advancement of business management. The aim of this study is to assist companies in managing inventory more systematically and effectively. The objective of this study is to propose a prediction model by applying business analysis and visualizing it in the form of a dashboard. Utilizing the CRISP-DM model as a framework, this study applies ABC analysis in the development of the prediction model. The choice of algorithm for this study will be based on selecting the best algorithm for model development proposal. Confusion Matrix is used in evaluating the model. The RapidMiner tool is used to develop the predictive model, while the dashboard is developed using the Power BI tool. The study will evaluate the dashboard by selecting three experts as assessors. Hopefully, this proposed model will enhance inventory management for the company even further.

Keywords: Business Intelligence, Business Analysis, Predictive Analysis, ABC Analysis, CRISP-DM

Introduction

Over the past decade, there has been a notable shift in how businesses handle their operations, particularly regarding the adoption of technology for sales forecasting and inventory management. Business Intelligence (BI) has emerged as a key tool for conducting analytical processes. Initially conceived by Howard Dressner, an analyst at Gartner Group, in the early 1990s, BI has evolved into a strategic initiative recognized by business leaders for its role in enhancing efficiency and fostering innovation.

Business Intelligence (BI) primarily involves technology-driven methods for analyzing and presenting business data to facilitate decision-making, focusing on historical and current data to provide descriptive insights into past or ongoing activities. Complementing BI is Business Analytics (BA), which delves deeper into analysis, often utilizing predictive or prescriptive modeling to interpret, analyze, and visualize data for informing business strategies, streamlining processes, and improving performance. Both BI and BA serve information access, data analysis, and reporting purposes,

empowering employees and managers across organizational levels with timely and relevant information, ultimately enhancing decision-making processes.

Prediction analysis, a critical technique within business analytics, utilizes historical sales data, market trends, and relevant information to forecast future product demand. The objective is to predict the quantity of specific items or products a business should stock to meet customer demand while minimizing surplus inventory or stockouts. By analyzing past sales patterns, seasonal fluctuations, and other variables, businesses can optimize supply chain management, reduce carrying costs, and enhance overall operational efficiency.

Many companies encounter challenges in managing their inventory, particularly within warehouse operations. One prevalent issue is persistent overstocking, where staff consistently order more products than can be sold within a reasonable timeframe. This overstocking ties up physical space and can hamper warehouse efficiency. Another problem arises from insufficient stock for high-demand products, often due to inaccurate demand forecasting. If a company struggles to predict which products will be in high demand, it may end up with inadequate stocks when actual demand exceeds projections, resulting in lost sales opportunities. Additionally, stock shortages can strain the company's supply chain as it attempts to meet demand.

Furthermore, some companies lack information about the demand for their stock, indicating a failure to understand the factors influencing stock market demand. This information gap may stem from communication issues with suppliers, as the company may not prioritize transparent communication. Without regular updates on financial performance and prospects, suppliers may struggle to make well-informed decisions about the company's stock, leading to further complications.

Therefore, this study focuses on businesses offering a diverse range of products to meet consumer demand across various categories. By encompassing multiple brands, it highlights the breadth of product offerings available in the market, enabling consumers to choose based on preferences and requirements. Specifically, the study aims to utilize business intelligence to analyze and forecast stock trends for a company. Through data analysis, the company can gain deeper insights into stock movements, navigate industry challenges effectively, and make informed decisions regarding inventory management. Predictive modeling may be employed to anticipate inventory demand, optimizing inventory levels and directing attention to high-demand products.

This study proposes a model to assist companies in forecasting future inventory needs. The objectives of this study are as follows:

i. Proposing an inventory prediction model for a company using ABC analysis.
ii. Developing a dashboard to visualize the results of inventory management predictions.

The next section will begin by examining related works in the field of business analysis trends. Subsequently, the study will present the methodology framework and finally, the paper will conclude with a summary of the study.

Related Work

To forecast the future of businesses effectively, it's optimal to merge business management, business modeling procedures, and information technology. Leveraging big data proficiently through predictive analytics can be highly advantageous for businesses. Companies that exhibit proactive, forward-thinking approaches and can anticipate patterns or behaviors stand to benefit significantly from this technology.

Predictive analytics encompasses several steps through which a data analyst can forecast future outcomes based on present data. The process of predictive analytics is depicted in Figure 1 below:

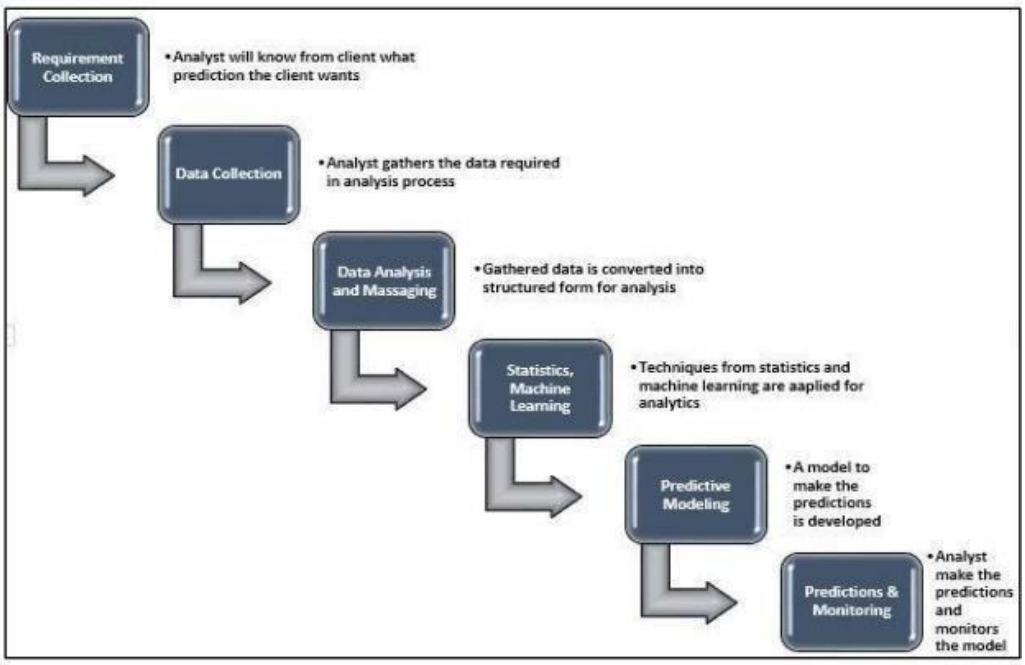

Figure 1: Predictive Analytics Process

Choosing the right prediction modeling strategy is crucial as it drives the predictive analytics process. Predictive analytics involves using statistical algorithms and machine learning techniques to analyze historical data and predict future events or trends. It identifies patterns, correlations, and relationships in data to create models that forecast outcomes, enabling informed decision-making for businesses and organizations. Techniques include linear regression, decision trees, neural networks, and time series analysis. By leveraging predictive analytics, entities can gain insights into future scenarios, optimize processes, manage risks, and make proactive decisions for competitive advantage. Table 1 illustrates a previous study implementing predictive analytics techniques.

Table 1: The Techniques Of Predictive Analytics

Technique	Purpose	Evaluation	Article Citation
Decision Tree	Classification model but it can be sed in regression as well. It is a tree-like model which relates the decisions and them. possible consequences.	An illustration of an upside-down tree; it features a hierarchical tree structure with leaf, internal, branch, and root nodes.	(Kaminski et.al, 2018)
Regression Model	The relationship between a dependent variable and one or more independent variables and analyzes how the value of the dependent variable changes on changing the values	Once one or more explanatory variables change, a regression model can show whether changes in the dependent variable's value are related to those changes.	(Arnstrong et.al, 2012)
Time series analysis	Statistical technique that uses time series data that is collected over sometime at a particular interval. It combines traditional data mining technique sand prediction.	Use techniques. like cross- validation and visual inspection of prediction versus actual values are commonly used for assessment	(Lin, 2003)
Ensemble Learning	These models are created by merging the prediction. outcomes of multiple models of a similar sort that have been trained. The model's accuracy is increased in this way.	Evaluate by bagging and boosting, aiming to improve overall model. performance and combining predictions from multiple models.	(Polikar, 2006)
Classification	The task of categorizing data into predefined classes or labels based on its features.	The classification model draws an interpretation based on the initial training values that were entered. It will predict the fresh data's class categories.	(Eckerson,2009)
Clustering	Machine learning task that involves grouping similar data points together based on their inherent patterns or features, without predefined labels.	One method of classifying objects in various groups that have the foreach comparable group at a wide scale is clustering.	(Charles et al,2022)

Methodology Framework

For the methodology framework, we're using The CRoss Industry Standard Process for Data Mining (CRISP-DM) Model. It's a structured way to develop projects, widely recognized for discovering knowledge in different projects. CRISP-DM helps us by breaking down the project into clear steps, making sure we don't miss anything important. It's like a cycle, so we can keep improving and making changes as needed. This method is reliable for getting valuable insights to help with decision-making. Our adapted CRISP-DM framework includes seven stages: Project Planning, Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment. Each stage is explained in Table 2 below, based on Saltz's work from 2021.

Table 2: Methodology Framework

Phase	Activity	Deliverable
Project planning	Propose potential project. Prepare interview questionnaire	Proposed work. Questionnaire.
Business understanding	Conduct interview. Determine business objectives. Access situation. Determine project goals. Produce project plan.	Interviewed result. Business objective. Current process. Project goals.
Data understanding	Collect data. Describe data. Explore data. Verify data quality.	Sales data. Inventory data.
Data preparation	Select data. Clean data. Construct data. Integrate data. Format data.	Determined data sets. Cleaned dataset. Selected attributes. Combined data set. Formatted data.
Modelling	Select modelling technique. Generate test design. Build model. Access model.	ABC analysis, Decision Tree Accuracy.
Evaluation	Evaluate results. Review process. Determine next step.	Confusion matrix
Deployment	Deploy model.	Dashboard Development Expert Evaluation.

Model Development

In this study, we will employ the ABC analysis, which is widely recognized as one of the most effective methods for inventory classification. The ABC analysis is based on the Pareto Principle, which suggests

that roughly 20% of causes lead to 80% of effects. This method categorizes items based on their importance or their contribution to specific goals, such as sales, profit, or project success.

The project adopts the ABC analysis technique after recognizing the need for a systematic approach to prioritize and manage various tasks and components effectively. ABC Analysis, being strategic in nature, categorizes items or activities into three categories based on their importance, influence, or contribution towards achieving a specific goal or aim. Each category signifies a different level of significance or contribution to the overall objective. These categories are labeled as Class A, Class B, and Class C, with a depiction of the model shown in Figure 2.

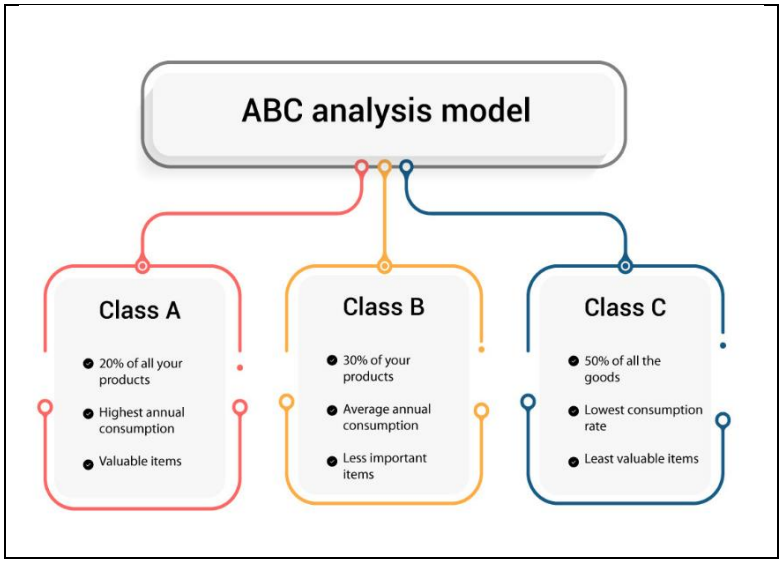

Figure2 : Description of ABC analysis

Class A, also known as High Impact, comprises items that are of utmost importance and consequence. These components are critical to a project or process, though they may be few in number, their impact is significant. For example, high-value products with substantial sales volume would fall under Class A. Class B, referred to as Moderate Impact, lies between the highly impactful Class A and the less crucial Class C. Items in Class B are of intermediate relevance. While they contribute to achieving the main goal, they may not hold as much importance as those in Class A. An example could be a product in inventory management with consistent sales and a reasonable profit margin. Class C, also known as Low Impact, includes products with minimal significance or effect. Although these items are important, they do not have a substantial impact on the overall goal. Products in Class C in inventory management might have lower profit margins or sales volumes compared to those in Class A and B.

Model Validation

Ensuring the accuracy and reliability of categorization in ABC analysis involves validating the outcomes after assigning products to categories. Before evaluation, a predictive model was constructed using RapidMiner, a tool that seamlessly integrates various machine learning algorithms such as decision trees, support vector machines, and more. The chosen algorithm for this project is a decision tree.

A decision tree is a tree-like model used in machine learning and data mining to make decisions. It consists of nodes representing decisions based on specific features or attributes, branches representing outcomes, and leaf nodes representing final decisions or predicted outputs. Decision trees are commonly used for classification and regression tasks.

Following the modeling process, the predictive model will be evaluated, and the categorization results will be validated. This involves assessing the coherence of the categorization with past data and market patterns. During validation, any significant changes in product performance or market conditions should be considered. After validating the results of product categorization, a dashboard will be created to display the outcomes. Table 3 provides a summary of the modeling and validation results.

Table 3 Summary of modelling and validate results.

Activities	Description
Predictive Model	Using RapidMiner
Modelling technique	Construct model using predictive algorithm
Validate	Validate predictive model and results.

Dashboard Development dan Expert Evaluation.

The final step is the dashboard board development. Creating a dashboard to display the outcomes of an ABC analysis is a strategic step that enhances the understandability and accessibility of the information. As Sarikaya et al. (2018) suggest, dashboards visualize data and are most effective when they support users in achieving their goals. Unfortunately, many dashboards are not designed with usability in mind; instead, they prioritize visualizing as much data as possible to showcase graphical capabilities.

This study utilizes Power BI to develop the dashboard. Power BI is a business analytics service offered by Microsoft, enabling users to visualize data and share insights. It seamlessly converts data from various sources to create interactive dashboards and Business Intelligence reports. Utilizing Power BI simplifies dashboard development due to its user-friendly features and ease of use.

Conclusion

The study's expected outcomes include the development of a prediction model for inventory management, presented in a well-designed dashboard. This tool aims to significantly enhance management strategy by leveraging historical data and relevant analytical insights, thereby improving inventory prediction accuracy. The dashboard offers a visual representation of essential inventory metrics and classification parameters, allowing users to quickly grasp product distribution across different categories. This facilitates easy visualization of product categorization, distinguishing between items with low and high customer demand. Essentially, it provides staff with a clear overview of product popularity and demand levels.

Moreover, the dashboard enables staff to plan and organize inventory effectively by monitoring stock levels and anticipating potential shortages or overstock situations. Its visual nature simplifies the prioritization of stock orders based on current needs and market trends, leading to more informed and efficient decision-making in inventory management. Overall, the dashboard serves as a powerful tool for streamlining planning processes and optimizing stock orders with greater accuracy, empowering staff to make data-driven decisions and enhance overall inventory management efficiency.

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PERBANDINGAN PENCAPAIAN KURSUS MATEMATIK DALAM KALANGAN PELAJAR IJAZAH KEJURUTERAAN LEPASAN POLITEKNIK DAN LEPASAN MATRIKULASI DALAM SUBJEK KALKULUS UNTUK JURUTERA: KAJIAN KES PELAJAR SEMESTER SATU, UiTM CAWANGAN PULAU PINANG

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ABSTRACT

Kursus matematik merupakan kursus teras yang wajib diambil oleh pelajar yang mengikuti program kejuruteraan dan pelajar perlu lulus untuk memenuhi syarat penganugerahan ijazah. Kegagalan pelajar serta pencapaian yang kurang memuaskan dalam kursus matematik turut memberi kesan negatif kepada prestasi individu dan keseluruhan kepada institusi. Persepsi akan pencapaian subjek matematik dari kalangan pelajar lepasan Politeknik dikatakan tidak memberangsangkan berbanding pelajar lepasan Matrikulasi. Justeru itu kajian ini dijalankan bagi mengenalpasti perbezaan keputusan peperiksaan bagi subjek Kalkulus Untuk Jurutera di kalangan pelajar lepasan diploma Politeknik dan pelajar lepasan Matrikulasi. Kajian ini merupakan kajian kuantitatif yang melibatkan analisis penilaian kursus matematik pelajar berdasarkan kerja kursus dan peperiksaan akhir. Sampel kajian adalah seramai 29 orang pelajar yang dipilih dari program kejuruteraan. Keputusan analisis data menunjukkan bahawa pencapaian pelajar lepasan Matrikulasi adalah lebih baik ($p<0.05$; $t=-2.083$) berbanding pelajar dari lepasan diploma Politeknik dan seterusnya mempengaruhi perbezaan pencapaian ini adalah signifikan pada aras keyakinan 0.05. Dapatan kajian menunjukkan majoriti pelajar lepasan diploma Politeknik tidak mengambil mata pelajaran matematik tambahan sewaktu peperiksaan SPM. Seterusnya mempengaruhi keputusan peperiksaan pelajar lepasan Politeknik semester satu dalam subjek Kalkulus. Kajian ini akan melihat kebenaran persepsi dan mencadangkan beberapa langkah yang mungkin dapat diambil bagi memperbaiki masalah ini.

Keywords: Pencapaian, Kursus Matematik, lepasan Politeknik, lepasan Matrikulasi

Pengenalan

Kalkulus Untuk Jurutera merupakan subjek teras yang wajib diambil bagi pelajar yang mengikuti program kejuruteraan pada semester pertama. Subjek ini wajib lulus dan disediakan untuk mempertingkatkan asas matematik bagi menyediakan pelajar mengikuti subjek matematik pada semester seterusnya iaitu Kalkulus Lanjutan. Menurut Montague dan Garderen (2003), subjek penguat kepada kursus kejuruteraan adalah subjek matematik. Namun begitu seringkali terdengar keluhan daripada pelbagai pihak tentang tahap pencapaian matematik yang kurang memberangsangkan dikalangan pelajar di universiti.

Kegagalan pelajar serta pencapaian yang kurang memuaskan dalam subjek matematik turut memberi kesan negatif kepada prestasi individu dan keseluruhan kepada institusi. Namun tidak boleh dinafikan bahawa ada faktor-faktor lain yang boleh mempengaruhi pencapaian subjek matematik mereka terutamanya dari kalangan pelajar pelbagai latarbelakang pendidikan. Persepsi tentang tahap penguasaan matematik yang lemah dikalangan pelajar dari pelajar lepasan Politeknik, berbanding pelajar lepasan Matrikulasi. Kajian ini akan melihat kebenaran persepsi ini dan mencadangkan beberapa langkah yang mungkin dapat diambil bagi memperbaiki masalah ini.

Politeknik merupakan institusi pendidikan yang bernaung di bawah Kementerian Pengajian Tinggi Malaysia serta mengambil bahagian dalam menyediakan pendidikan yang berteknologi bagi melahirkan para pekerja yang dapat memenuhi keperluan industri negara. Matrikulasi pula merupakan satu program persediaan bagi pelajar untuk melayakkan mereka melanjutkan pelajaran ke peringkat Ijazah Pertama. Kedua-dua program ini melayakkan mereka untuk melanjutkan pengajian peringkat Ijazah Sarjana Muda di universiti awam bergantung sepenuhnya kepada markah merit, bilangan tempat dan kelayakan calon. (Berita Harian, 2021).

Dapatan kajian Abdul Muqsith (2013) memang wujud perbezaan diantara pelajar lepasan diploma berbanding lepasan Matrikulasi di kalangan pelajar program Ijazah Sarjana Muda Kejuruteraan Mekanikal di UTHM. Antaranya adalah pelajar lepasan Matrikulasi sinonim dengan mata pelajaran bukan kejuruteraan seperti bahasa inggeris, matematik, fizik dan kimia kerana mereka adalah bekas pelajar berpencapaian cemerlang dalam Sijil Pelajaran Malaysia (SPM). Manakala pelajar dari kalangan lepasan diploma Politeknik pula dikaitkan dengan imej sebagai pelajar lebih matang, lebih cekap dalam mata pelajaran kejuruteraan tetapi kurang cekap dalam mata pelajaran umum seperti bahasa Inggeris, matematik, fizik dan juga kimia.Tambahan lagi menurut Abdul Muqsith (2013) mendapati terdapat perbezaan yang signifikan terhadap faktor sikap dan kemahiran belajar antara dua kumpulan ini.

Hasil kajian Mahyuddin (2008) mendapati wujudnya faktor perbezaan pencapaian akademik pelajar lepasan diploma dan Matrikulasi di mana hanya faktor latar belakang pendidikan sahaja berada di tahap yang sederhana bagi pelajar lepasan diploma. Bagi pelajar lepasan matrikulasi pula, faktor persediaan pelajar dari segi usia dan peranan sosial berada pada tahap tinggi. Manakala faktor persediaan pelajar dari segi motivasi dan faktor latar belakang pendidikan sahaja berada di tahap yang sederhana.

Hasil kajian yang dijalankan oleh Ishak Baba (2012) menunjukkan prestasi pelajar lepasan diploma Politeknik kurang cemerlang di peringkat awal pengajian. Prestasi akademik mereka semasa

bergraduat juga kurang berbanding dengan pelajar lepasan diploma IPT dan STPM tetapi mempunyai corak yang hampir sama dengan lepasan Matrikulasi.

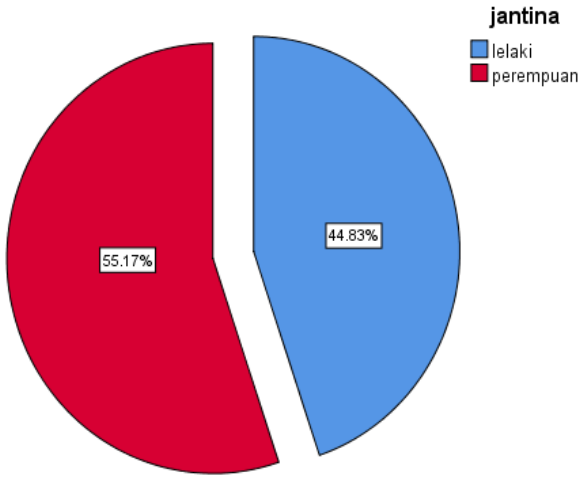
Melalui kajian ini dapat memberikan gambaran awal kepada para pensyarah tentang tahap penguasaan dan kefahaman terhadap subjek Kalkulus dalam kalangan pelajar lepasan Politeknik dan pelajar lepasan Matrikulsi sebelum mereka memasuki subjek matematik lanjutan pada semester berikutnya. Tindakan boleh diambil untuk memperbaiki tahap pencapaian akademik pelajar diantaranya terhadap pelajar lepasan Politeknik dan pelajar lepasan Matrikulasi.

Metodologi

Kajian ini dijalankan terhadap pelajar yang mengikuti program Ijazah Sarjana Muda Kejuruteraan semester satu dan mengambil subjek Kalkulus Untuk Jurutera. Data diperolehi daripada 29 orang pelajar melibatkan pelajar dari lepasan Politeknik dan pelajar lepasan Matrikulasi. Proses penganalisaan data berbentuk kuantitatif melalui pemeriksaan dokumen skrip jawapan peperiksaan dan instrumen kajian adalah melalui penilaian kerja kursus dan penilaian peperiksaan akhir untuk menggambarkan pencapaian keseluruhan pelajar.

Analisa dan Perbincangan

Analisa data yang dijalankan adalah dimulakan dengan analisa deskriptif. Rajah 1 menunjukkan gambarajah pie bagi jantina pelajar yang terlibat dalam kajian ini. Dapatan kajian menunjukkan 55.17% daripada responden adalah daripada kalangan pelajar perempuan, manakala 44.83% merupakan pelajar lelaki.



Rajah 1: Peratusan jantina pelajar

Jadual 1: Bilangan mengikut kategori pelajar lepasan Politeknik dan pelajar lepasan Matrikulasi

Program	Lepasan Politeknik	Lepasan Matrikulasi
EE200	0	6
EC221	1	2
EC223	10	8
EM245	2	0

Jadual 1 menunjukkan bilangan pelajar lepasan Politeknik dan Matrikulasi dalam beberapa program pengajian kejuruteraan. Program EC223 menonjol dengan jumlah pelajar terbanyak dari kedua-dua kategori, dengan 10 pelajar lepasan Politeknik dan 8 pelajar lepasan Matrikulasi. Sebaliknya, program EE200 tidak mempunyai pelajar lepasan Politeknik tetapi memiliki 6 pelajar lepasan Matrikulasi. Selain itu, program EM245 mempunyai 2 pelajar lepasan Politeknik tetapi tiada pelajar lepasan Matrikulasi.

Jadual 2: Purata markah peperiksaan akhir mengikut kategori

	Lepasan	N	Purata	Sisihan Piawai (SP)
Markah Peperiksaan Akhir	Politeknik	13	28.038	18.5005
	Matrikulasi	16	45.469	25.1121

Jadual 3: Ujian t sampel tak bersandar

	Ujian Levene		Ujian t sampel tak bersandar		
	F	Sig.	t	darjah kebebasan	Sig.
Markah Peperiksaan Akhir	1.645	.211	-2.083	27	0.047

Jadual 3 menunjukkan keputusan Ujian t sampel tak bersandar yang telah dijalankan terhadap markah peperiksaan akhir. Ujian ini telah menunjukkan bahawa purata markah peperiksaan akhir adalah berbeza secara signifikan di antara pelajar lepasan Matrikulasi (purata = 45.469, SP = 25.1121) dan pelajar lepasan Politeknik (purata = 28.038, SP = 18.5005). Dapatan ujian menunjukkan terdapat perbezaan yang signifikan di antara kedua-dua kumpulan pelajar ($p < 0.05$). Walaupun hanya menggunakan sampel 29 pelajar, data markah peperiksaan akhir cukup untuk menunjukkan perbezaan ini adalah signifikan.

Jadual 2 menunjukkan purata markah peperiksaan akhir mengikut kategori. Purata markah yang lebih rendah untuk pelajar lepasan Politeknik (28.038) berbanding dengan pelajar lepasan Matrikulasi (45.469) menunjukkan perbezaan dalam tahap prestasi antara dua kumpulan tersebut. Hal ini boleh disebabkan oleh faktor seperti latar belakang pelajar, struktur kurikulum, kaedah pengajaran, pengalaman pembelajaran sebelumnya, dan sokongan akademik juga boleh mempengaruhi prestasi purata kumpulan.

Analisis terhadap perbandingan purata markah ini penting bagi institusi pendidikan untuk menilai keberkesanan kurikulum dan proses pengajaran, serta untuk mengenal pasti peluang penambahbaikan dalam usaha meningkatkan prestasi pelajar. Selain itu, ia juga memberi maklumat kepada pentadbir dan pensyarah untuk menyediakan sokongan tambahan kepada pelajar yang memerlukan bantuan dalam meningkatkan prestasi akademik khasnya dalam subjek matematik.

Jadual 4: Jadual analisis silang

			Matematik Tambahan (SPM)		
			Ya	Tidak	Jumlah
Lepasan	Politeknik	Bilangan	2	11	13
		Jumlah %	6.9%	37.9%	44.8%
	Matrikulasi	Bilangan	16	0	16
		Jumlah %	55.2%	0.0%	55.2%
Jumlah		Bilangan	18	11	29
		Jumlah %	62.1%	37.9%	100.0%

Jadual 4 menunjukkan jadual analisis silang antara kategori pelajar, lepasan Politeknik dan lepasan Matrikulasi dan sama ada pelajar berkenaan mengambil mata pelajaran Matematik Tambahan ataupun tidak sewaktu menduduki peperiksaan Sijil Pelajaran Malaysia (SPM). Data menunjukkan perbezaan dalam pengambilan mata pelajaran Matematik Tambahan diperingkat SPM antara pelajar lepasan Politeknik dan lepasan Matrikulasi.

Daripada pelajar lepasan Politeknik, hanya 2 pelajar (6.9%) yang mengambil Matematik Tambahan manakala 11 pelajar (37.9%) tidak mengambilnya. Sebaliknya, bagi pelajar lepasan Matrikulasi, 16 pelajar (atau 55.2% daripada jumlah pelajar) mengambil Matematik Tambahan manakala tiada pelajar yang tidak mengambilnya. Peratusan yang tinggi pelajar lepasan Matrikulasi yang mengambil Matematik Tambahan menunjukkan keutamaan atau kepentingan yang lebih besar terhadap subjek tersebut dalam kalangan pelajar dari latar belakang Matrikulasi berbanding dengan pelajar Politeknik. Hal ini mungkin berkaitan dengan penekanan kurikulum dan persediaan bagi program Matrikulasi yang mungkin lebih menekankan kepentingan Matematik Tambahan juga dalam keperluan program pengajian setelah menamatkan persekolahan menengah.

Kesimpulan

Daripada kajian yang dilakukan terhadap 29 pelajar Ijazah Kejuruteraan semester satu sesi Oktober 2023 di Universiti Teknologi Mara (UiTM) Cawangan Pulau Pinang menunjukkan terdapat perbandingan yang signifikan antara pelajar lepasan Politeknik dan lepasan Matrikulasi terhadap pencapaian pelajar dalam peperiksaan akhir bagi subjek Kalkulus Untuk Jurutera.

Dapatan kajian menunjukkan bahawa pelajar lepasan Matrikulasi mempunyai asas matematik yang kukuh kerana mereka mengambil mata pelajaran Matematik Tambahan sewaktu peperiksaan SPM. Berbeza dengan pelajar lepasan Politeknik yang majoritinya tidak mengambil mata pelajaran Matematik Tambahan. Hal ini membuktikan bahawa pelajar yang tidak mempunyai asas matematik yang kukuh di peringkat sekolah menengah akan memberi kesan terhadap pencapaian pelajar dalam subjek Kalkukus Untuk Jurutera diperingkat ijazah. Namun demikian pelajar tidak seharusnya menjadikan alasan tidak mengambil subjek Matematik Tambahan sebagai punca mereka tidak lulus dalam subjek Kalkulus sedangkan pelajar seharusnya mengoptimumkan usaha dan memperbanyakkan latih tubi. Sikap pelajar dan cara belajar pelajar itu sendiri juga perlu diberi perhatian supaya pembelajaran dan pemahaman terhadap matematik lebih berkesan.

Kajian ini juga mencadangkan agar pihak pengambilan diperingkat ijazah lebih peka terhadap kelayakan pelajar dengan menekankan pencapaian Matematik Tambahan sebagai subjek wajib khususnya bagi pelajar yang akan mengikuti program pengajian kejuruteraan. Ini kerana pelajar bakal menghadapi bebanan dan tekanan sekiranya tidak mengambil subjek matematik tambahan dan tidak menguasai subjek matematik dengan baik. Selain itu, para pensyarah perlu membuat penambahbaikan dari segi teknik pengajaran, menyediakan bahan-bahan kursus yang lebih baik dan terkini bagi menarik minat pelajar, memberi galakan kepada pelajar, memperbanyakkan latihan dan membina hubungan yang erat antara pensyarah dan pelajar. Pelaksanaan aktiviti yang dijalankan oleh pensyarah yang berpengalaman seperti mengamalkan konsep berpusatkan pelajar, pembelajaran interaktif, bengkel, klinik matematik dan lain-lain program yang dapat memberi impak terhadap prestasi pelajar terutama pelajar lepasan Politeknik. Peranan pensyarah amatlah diperlukan bagi memantau akan pencapaian akademik pelajar disamping meneruskan aktiviti penambahbaikan yang telah dirancang dengan berkesan.

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KAJIAN TAHAP KEBIMBANGAN DAN MINAT PELAJAR PRA SAINS TERHADAP MATEMATIK

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ABSTRACT

Matematik sering kali menjadi subjek yang mencetuskan pelbagai reaksi dalam kalangan pelajar. Minat terhadap matematik boleh menjadi faktor penting dalam meningkatkan kefahaman dan prestasi pelajar dalam bidang matematik. Sebaliknya, kebimbangan terhadap matematik sering kali timbul apabila pelajar merasa tidak yakin atau tidak berminat, yang boleh mengakibatkan penolakan terhadap usaha pembelajaran. Justeru itu kajian ini dijalankan terhadap pelajar pra diploma sains bagi melihat sejauh mana tahap kebimbanagan dan minat pelajar terhadap matematik dan hubungan di antara kedua-duanya. Hasil dapatan kajian menunjukkan bahawa pelajar-pelajar ini mempunyai tahap kebimbangan yang agak tinggi. Walaubagaimanapun, majoriti daripada mereka mempunyai rasa minat yang tinggi terhadap matematik. Ujian korelasi Spearman Rho yang di jalankan pula menunjukkan hubungan linear negatif yang sederhana dan signifikan terhadap kedua-duanya iaitu semakin tinggi minat seseorang terhadap matematik, semakin rendah kebimbangan yang dirasakan. Oleh itu, tindakan yang proaktif perlu diambil untuk mengurangkan tahap kebimbangan pelajar di samping meningkatkan minat pelajar terhadap pembelajaran matematik.

Keywords: *Minat, kebimbangan, matematik, korelasi, kefahaman*

Pengenalan

Matematik bukan sahaja merupakan satu aspek penting dalam kurikulum pendidikan, tetapi juga memainkan peranan yang besar dalam pembentukan kemahiran pemikiran kritis, daya penyelesaian masalah, dan kemampuan analitikal pelajar. Oleh itu, minat yang positif terhadap matematik bukan sekadar memberikan kepuasan dalam pencapaian akademik, tetapi juga membawa impak yang mendalam terhadap perkembangan intelektual dan profesional seseorang. Di samping itu, kebimbangan terhadap matematik juga boleh memberi kesan negatif terhadap aspek-aspek ini, menyumbang kepada ketidakpastian dalam membuat keputusan, kurang keyakinan dalam menangani masalah, dan pembentukan imej diri yang negatif.

Minat pelajar terhadap matematika mencerminkan daya tarikan, kecenderungan, dan semangat untuk mempelajari matematik. Minat ini dapat dipengaruhi oleh berbagai faktor, termasuk pengalaman, kaedah pengajaran, dan persepsi pelajar terhadap matematika dan hubungannya dengan kehidupan seharian. Menurut Hashim (2000), minat adalah daya penggerak yang mendorong kita supaya memberi

perhatian kepada sesuatu yang diminati. Pelajar yang mempunyai minat untuk belajar akan berasa seronok dan bersungguh-sungguh untuk belajar kerana mereka akan mendapat kepuasan daripada proses pembelajaran itu sendiri dan juga dapat mencapai prestasi yang lebih cemerlang. Azizi Yahaya dan Shahrin Hashim (2008) juga dalam kajiannya menyatakan bahawa minat yang tinggi dalam mata pelajaran tertentu akan menggalakkan pelajar mendalami subjek tersebut. Mereka akan lebih tekun, aktif dalam kelas, dan mencari pemahaman yang lebih berkaitan konsep matematik. Sebaliknya,minat yang rendah, kemungkinan besar mereka akan mudah bosan, dan tidak ada inisiatif untuk apa yang harus mereka pelajari (Zebua & Harefa, 2022).

Kebimbangan terhadap matematik juga sering menjadi satu cabaran yang dihadapi oleh pelajar. Kebimbangan terhadap matematik adalah lebih kepada reaksi emosi atau perasaan negatif yang berkaitan khusus dengan subjek matematik. Mereka akan merasa cemas, takut, atau tidak selesa ketika terlibat dalam aktiviti atau pembelajaran matematik. Ini mungkin termasuk ketidakselesaan terhadap masalah matematik, kekhuatiran terhadap ujian matematik, atau rasa kurang keyakinan terhadap keupayaan diri dalam menangani konsep-konsep matematik (Hunt & Zakaria 2018). Secara tidak langsung, mereka mungkin beranggapan bahawa subjek ini sukar, rumit, atau tidak menarik, yang boleh merosakkan keyakinan diri mereka.

Sekiranya kebimbnagan terhadap matematik berterusan, ini akan mengakibatkan pencapaian mereka dalam matematik turut terjejas. Terdapat beberapa kajian bagi melihat hubungan di antara kebimbangan terhadap matematik dengan pencapaian matematik pelajar. Hasil kajian yang diperolehi oleh Juniati dan Budayasa (2020) mendapati bahawa tahap kebimbangan yang tinggi akan dapat mewujudkan perasaan takut terhadap matematik sehingga menjejaskan keputusan matematik pelajar. Gunderson et al. (2018) juga berpendapat bahawa pelajar yang berkebimbangan matematik tinggi akan memperolehi pencapaian matematik yang rendah. Oleh yang demikian, kebimbanagn terhadap matematik perlu diambil perhatian dan di kurangkan dengan melihat faktor-faktor yang menyebabkan kebimbangan ini berlaku. Menurut kajian oleh Sim & Siti (2022), terdapat enam faktor yang menyebabkan kebimbangan pelajar terhadap matematik iaitu faktor akademik, demografi, keluarga, guru, diri sendiri, serta rakan sebaya. Faktor yang banyak dikaji adalah faktor dominan seperti pencapaian matematik, jantina, efikasi kendiri dan motivasi.

Kesedaran terhadap hubungan antara minat dan kebimbangan terhadap matematik dapat memberi pencerahan kepada pendidik dan pelajar untuk menyelami aspek-aspek yang mempengaruhi pembelajaran matematik. Dengan memahami bagaimana minat dan kebimbangan saling berkait, pendekatan yang lebih holistik dan bersepadu boleh dirancang untuk memberikan sokongan kepada pelajar dalam menghadapi cabaran matematik. Oleh itu, penting untuk mengatasi kebimbangan pelajar dengan pendekatan pengajaran yang menyenangkan, memberikan sokongan tambahan, dan

menunjukkan aplikasi praktikal matematik dalam kehidupan sehari-hari untuk meningkatkan motivasi dan pemahaman mereka.

Metodologi

Kajian ini dijalankan terhadap pelajar-pelajar pra sains yang mengambil subjek matematik di UiTMCPP. Kesemua responden yang terlibat adalah seramai 44 orang. Mereka diberi soalan kaji selidik yang disediakan melalui *'Google Form'* . Sebanyak 14 item soalan yang diambil daripada *MAS (mathematics anxiety scales)* oleh Mahmood, S., & Khatoon, T. (2011) dan sedikit pengubahsuaian dibuat terhadap item soalan tersebut. Soalan - soalan ini melibatkan masing-masing 7 item positif dan negatif berdasarkan 4 skala likert. Item negatif adalah soalan berkaitan kebimbangan terhadap matematik manakala item positif pula adalah lebih kepada minat pelajar terhadap matematik. Data yang diperolehi dianalisa secara deskriptif statistik menggunakan aplikasi SPSS 2.0. Selain itu hubungan di antara kedua-dua item ini juga dikaji dengan menggunakan Ujian Korelasi Spearman Rho kerana data yang diperolehi adalah data ordinal.

Analisa kebolehpercayaan terhadap 14 item soalan ini dijalankan terlebih dahulu menggunakan alpha Cronbach. Secara keseluruhan, nilai alpha Cronbach yang diperolehi adalah 0.823. Manakala nilai alpha Cronbach bagi item positif dan negatif masing-masing adalah 0.69 dan 0.79. Oleh itu kesemua 14 item yang digunakan untuk kajian ini adalah sesuai dan baik kerana menurut Chua, 2014; Darusalam & Hussin, 2018, nilai kebolehpercayaan yang baik adalah di antara 0.65 hingga 0.95 .

Analisa Data

Analisa deskriptif bagi tahap kebimbangan pelajar terhadap matematik dalam kajian ini merujuk kepada nilai kekerapan dan peratus. Hasil dapatan kajian bagi 7 item negatif ditunjukkan dalam Jadual 1.

Jadual 1 : Kekerapan bagi Tahap Kebimbangan terhadap Matematik

Tahap	Julat skor	Kekerapan	Peratus (%)
Tinggi	2.68 - 4.00	19	43.2
Sederhana	2.34 - 2.67	12	27.3
Rendah	1.00 - 2.33	13	29.5
Jumlah		44	100

Didapati bahawa seramai 19 orang pelajar mengalami tahap kebimbangan yang tinggi atau 43.2%. Diikuti oleh tahap kebimbangan pelajar yang rendah (29.5%) dan tahap kebimbangan pelajar

yang sederhana (27.3%). Walaubagaimanapun perbezaan min bagi ketiga-tiga tahap kebimbangan pelajar terhadap matematik adalah tidak ketara, tetapi masih terdapat ramai pelajar yang merasa bimbang dengan subjek matematik.

Jadual 2 pula menunjukkan minat pelajar terhadap matematik. Hasil dapatan kajian menunjukkan hanya terdapat dua tahap yang dihadapi oleh pelajar iaitu sederhana dan rendah. Majoriti pelajar iaitu seramai 43 orang (97.7%) mempunyai minat yang tinggi terhadap matematik. Hanya seorang sahaja pada tahap sederhana (2.3%). Ini menunjukkan bahawa minat pelajar terhdap matematik adalah pada tahap yang tinggi dan keadaan ini dapat mengurangkan rasa kebimbangan mereka terhadap matematik.

Jadual 2 : Kekerapan bagi Minat terhadap Matematik

Tahap	Julat skor	Kekerapan	Peratus (%)
Tinggi	2.68 - 4.00	43	97.7
Sederhana	2.34 - 2.67	1	2.3
Rendah	1.00 - 2.33	0	0
Jumlah		44	100

Dapatan kajian berdasarkan gabungan minat dan kebimbangan pelajar terhadap matematik pula ditunjukkan dalam jadual 3 di bawah. Majoriti tahap kebimbanagn pelajar berada pada tahap yang rendah iaitu 28 orang (63.6%). walaubagaimanapun masih terdapat kebimbangan yang tinggi iaitu seramai 5 orang (11.4%) Keadaan ini berlaku kerana adanya minat pelajar yang tinggi (Jadual 2) terhadap matematik yang menjurus kepada kurangnya rasa bimbang terhadap matematik.

Jadual 3 : Kekerapan bagi gabungan Minat dan Kebimbangan terhadap Matematik

Tahap	Julat skor	Kekerapan	Peratus (%)
Tinggi	2.68 - 4.00	5	11.4
Sederhana	2.34 - 2.67	11	25
Rendah	1.00 - 2.33	28	63.6
Jumlah		44	100

Seterusnya, berdasarkan ujian korelasi Spearman Rho, nilai r = -0.5 dan nilai p = 0.0 (<0.01). Ini menunjukkan bahawa terdapat hubungan yang negative tetapi sederhana dan signifikan di antara kebimbangan dan minat terhadap matematik. Semakin tinggi tahap kebimbangan pelajar, semakin rendah minat mereka terhadap matematik. Oleh itu secara kesimpulannya pelajar pra sains mempunyai minat yang tinggi dalam matematik walaupun ada di antara mereka mempunyai kebimbangan pada tahap yang tinggi.

Kesimpulan

Kajian yang dijalan ini adalah bagi melihat tahap kebimbangan pelajar terhadap matematik. Di samping itu juga minat pelajar turut dikaji bagi melihat hubungan di antara kedua-duanya. Kesimpulan yang diperolehi daripada kajian ini menunjukkan bahawa majoriti pelajar mempunyai minat yang tinggi dalam matematik, namun kebimbangan terhadap subjek ini masih kekal tinggi. Hubungan negatif yang sederhana antara minat dan kebimbangan menyerlahkan kerumitan hubungan psikologi pelajar dengan matematik. Meskipun minat tinggi dapat memberikan dorongan positif, kebimbangan yang tinggi menunjukkan adanya cabaran dalam membentuk persepsi yang positif terhadap matematik.

Oleh itu, tindakan yang disasarkan adalah perlu untuk menyelidik dan mengatasi faktor-faktor yang boleh menyebabkan keraguan berterusan dalam kalangan pelajar yang sebenarnya mempunyai minat yang tinggi terhadap matematik. Adalah penting untuk merangkumi hasil kajian ini dengan merancang langkah-langkah intervensi yang sesuai. Penekanan perlu diberikan kepada pembinaan keupayaan metakognitif pelajar, peningkatan pengawalan emosi, serta penyediaan persekitaran pembelajaran yang menyokong perkembangan positif terhadap minat dalam matematik dan mengurangkan faktor-faktor yang mencetuskan kebimbangan. Dengan merangkul pendekatan holistik ini, kita dapat membentuk landskap pembelajaran matematik yang lebih positif, memperkukuhkan minat pelajar, dan pada masa yang sama mengurangkan kebimbangan yang mungkin menjadi halangan dalam pencapaian mereka.

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PREDICTION OF STROKE DISEASE USING MACHINE LEARNING TECHNIQUES

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ABSTRACT

Stroke is a global disease that is reported to increase annually and is a leading cause of mortality worldwide. The advancement of data analytics and machine learning has made it possible to foretell future patterns and insights, which could lead to the discovery of novel treatments for this condition. This study has investigated five commonly used machine learning algorithm to be constructed as potential models for predicting stroke dataset. Jupyter Notebook, a phyton-base engine, was employed as a data analytic tool for the purpose of analysing and evaluating all of the models. The five models were Decision Tree, Logistic Regression, Linear Discriminant Analysis, Gaussian Naïve Bayes and Support Vector Machine, have being implemented to predict binary outcome of stroke and no stroke. The accuracy percentage reported that Logistic regression outperformed other models with 50.93%.

Keywords: prediction, stroke, machine learning, data analytic, algorithm

Introduction

The number of people suffering from a stroke is increasing every day. Stroke or also known as “angin ahmar” among local Malaysian community is a cerebrovascular disease that happen when blood flow to the brain is restricted, blocked or reduced. According to Department of Statistic Malaysia (2022), stroke is third leading death among Malaysian, after Ischaemic heart disease and Lower repository infections. Several studies recently indicate the increasing trends among low and middle income countries, compared to high-income countries and rising trend among young adults (Wen et al. (2021); Kay & Venketasubramaniah(2022)).

Artificial intelligence is widely used in healthcare and medicine to assist doctors in making decisions by offering enhanced and accurate diagnosis and prognoses. Thanks to advancements in machine learning algorithms and statistical understanding, data mining and analytics have evolved beyond descriptive analysis to encompass predictive and prescriptive analytics. Figure 1 demonstrates the association of data mining with other disciplines, mutually union and complement each other to exploits three promising analytical approaches driven by information. The potential of these emerging

technologies goes beyond the medical field and permeates several aspects of real-life situations, including science and technology, as well as humanities and social sciences.

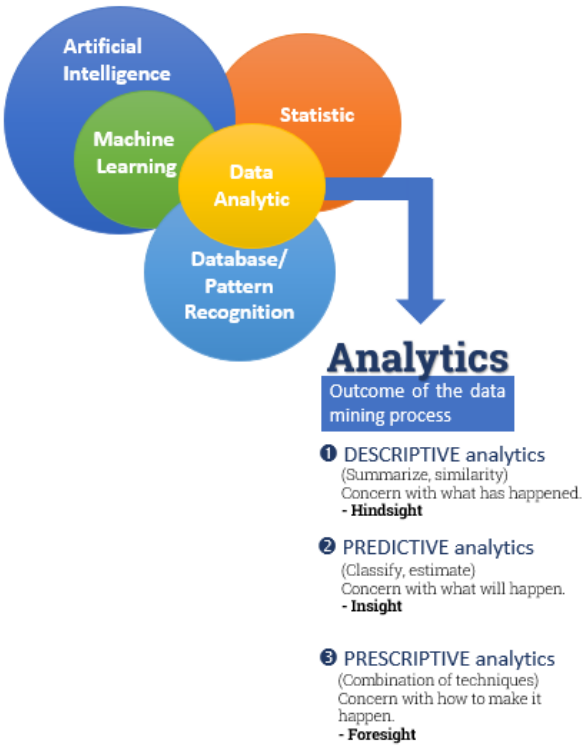


Figure 1: Analytics outcome from the emerging of data mining technology

In this era of digitalization, information is regarded as valuable as oil. Data analytics have the potential to greatly impact current and future endeavours as a result of the extensive use of relevant technology. Data analytics has the ability to transform raw data into valuable insights, identifying trends and solving problems. It can enhance corporate processes, optimise decision-making, and stimulate economic expansion.

Research Methodology

The general framework of supervised machine learning implementation is illustrated in the Figure 2, where the data of consist of stroke patients' attributes were first went through some steps of pre-processing process in order to prepare prominent features for further analysis. Then, the data are split into testing and training randomly using 10-fold cross validation. The training data was used to construct the model based on selected machine learning algorithms. Meanwhile, testing data was used to validate the model when the prediction was done.

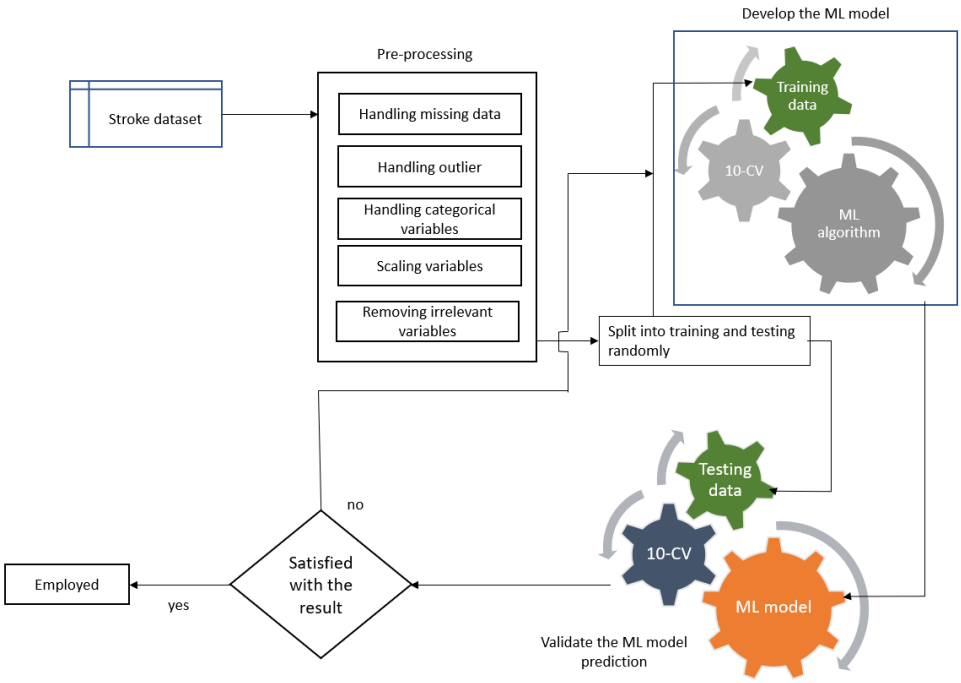


Figure 2: Research framework of stroke analysis

Understanding the Dataset

The stoke dataset is syntactic data from https://github.com/incribo-inc/stroke_prediction that classify patients from demographic and medical information to be diagnosed as stroke or non-stroke.

The datasets consist of 15,000 of record of patients and 22 attributes in total. The attributes are list of demographic and medical history information which are *'Patient ID', 'Patient Name', 'Age', 'Gender', 'Hypertension', 'Heart Disease', 'Marital Status', 'Work Type', 'Residence Type', 'Average Glucose Level', 'Body Mass Index (BMI)', 'Smoking Status', 'Alcohol Intake', 'Physical Activity', 'Stroke History', 'Family History of Stroke', 'Dietary Habits', 'Stress Levels', 'Blood Pressure Levels', 'Cholesterol Levels', 'Symptoms', 'Diagnosis'*. From these 22 attributes the first 21 are all features and the last one is considered as target attributes. The target attribute is two-class classification problem of stroke and non-stroke disease. Figure 3 illustrates the first five records of patients for all attributes (5 rows x 22 columns).

```
In [3]: # Load dataset
        df_stroke = pd.read_csv('stroke.csv')
        df_stroke.head()
```

Out[3]:

	Patient ID	Patient Name	Age	Gender	Hypertension	Heart Disease	Marital Status	Work Type	Residence Type	Average Glucose Level	...	Alcohol Intake	Physical Activity	Stroke History	Family History of Stroke	Dietary Habits	Stress Levels	Blood Pressure Levels	Cholesterol Levels	Symptoms	Diagnosis
0	18153	Mamooty Khurana	56	Male	0	1	Married	Self-employed	Rural	130.91	...	Social Drinker	Moderate	0	Yes	Vegan	3.48	140/108	HDL: 68, LDL: 133	Difficulty Speaking, Headache	Stroke
1	62749	Kaira Subramaniam	80	Male	0	0	Single	Self-employed	Urban	183.73	...	Never	Low	0	No	Paleo	1.73	146/91	HDL: 63, LDL: 70	Loss of Balance, Headache, Dizziness, Confusion	Stroke
2	32145	Dhanush Balan	26	Male	1	1	Married	Never Worked	Rural	189.00	...	Rarely	High	0	Yes	Paleo	7.31	154/97	HDL: 59, LDL: 95	Seizures, Dizziness	Stroke
3	6154	Ivana Baral	73	Male	0	0	Married	Never Worked	Urban	185.29	...	Frequent Drinker	Moderate	0	No	Paleo	5.35	174/81	HDL: 70, LDL: 137	Seizures, Blurred Vision, Severe Fatigue, Head...	No Stroke
4	48973	Darshit Jayaraman	51	Male	1	1	Divorced	Self-employed	Urban	177.34	...	Rarely	Low	0	Yes	Pescatarian	6.84	121/95	HDL: 65, LDL: 68	Difficulty Speaking	Stroke

5 rows × 22 columns

Figure 3: The first 5 patients' information from the datasets

Figure 4 reveals that among the 21 attributes, 8 are categorized as numeric types. The pattern of the values can be described using statistical measures such as standard deviation, minimum, maximum, and the quartiles (25%, 50%, and 75%) of the data. Example, the magnitude of the data on each feature represent by standard deviation (std) and further the smallest and largest value given by min and max consecutively. Meanwhile the rest of features, illustrates in Figure 5 are from nominal types except *'Cholesterol Levels', 'Blood Pressure Levels'* and *'Symptoms'* are string types.

```
In [4]: df_stroke.describe()
```

Out[4]:

	Patient ID	Age	Hypertension	Heart Disease	Average Glucose Level	Body Mass Index (BMI)	Stroke History	Stress Levels
count	15000.000000	15000.000000	15000.000000	15000.000000	15000.000000	15000.000000	15000.000000	15000.000000
mean	49715.802867	54.035667	0.249000	0.502933	129.445209	27.474302	0.500267	5.022694
std	29000.656642	21.063111	0.432448	0.500008	40.487792	7.230201	0.500017	2.873223
min	1.000000	18.000000	0.000000	0.000000	60.000000	15.010000	0.000000	0.000000
25%	24562.000000	36.000000	0.000000	0.000000	94.517500	21.160000	0.000000	2.540000
50%	49448.000000	54.000000	0.000000	1.000000	128.900000	27.420000	1.000000	5.050000
75%	75112.000000	72.000000	0.000000	1.000000	164.592500	33.720000	1.000000	7.520000
max	99975.000000	90.000000	1.000000	1.000000	200.000000	40.000000	1.000000	10.000000

Figure 4: The eight features with numeric type

```
In [5]: df_stroke.isnull().sum()

Out[5]: Patient ID                    0
        Patient Name                  0
        Age                           0
        Gender                        0
        Hypertension                  0
        Heart Disease                 0
        Marital Status                0
        Work Type                     0
        Residence Type                0
        Average Glucose Level         0
        Body Mass Index (BMI)         0
        Smoking Status                0
        Alcohol Intake                0
        Physical Activity             0
        Stroke History                0
        Family History of Stroke      0
        Dietary Habits                0
        Stress Levels                 0
        Blood Pressure Levels         0
        Cholesterol Levels            0
        Symptoms                   2500
        Diagnosis                     0
        dtype: int64
```

Figure 5: The list of all attributes provides by the stroke dataset

Pre-process the Dataset

Once the data has been comprehended, the pre-processing steps have been taken over to perform or reconstruct the pattern of the data for the desired analysis. The list of pre-processing steps has been proposed in the framework in Figure 2. Begin by addressing the issue of missing values. The *'Symptoms'* feature has 2500 missing data points, therefore will be eliminated. Additionally, the other three string properties, namely *'Cholesterol Levels'* and *'Blood Pressure Levels'* also being eliminated. Next, features that have unique values, such as *'Patient ID'* and *'Patient Name'*, as these unique values are not related to our target class. Scaling the numeric features are important due to different and varies magnitude of the data may cause the bigger magnitude will over shadow the small magnitude in modelling process. Figure 6 shows the scaling implementation to the first 6th numeric features using average scaling method and the implementation will not lost any original properties of the data.

	Age	Gender	Hypertension	Heart Disease	Marital Status	Work Type	Residence Type	Average Glucose Level	Body Mass Index (BMI)	Smoking Status	Alcohol Intake	Physical Activity	Stroke History
0	0.093263	Male	-0.575811	0.994150	Married	Self-employed	Rural	0.036180	-0.705993	Non-smoker	Social Drinker	Moderate	-1.000533
1	1.232733	Male	-0.575811	-1.005884	Single	Self-employed	Urban	1.340814	0.704803	Non-smoker	Never	Low	-1.000533
2	-1.331076	Male	1.736682	0.994150	Married	Never Worked	Rural	1.470981	-0.989536	Formerly Smoked	Rarely	High	-1.000533
3	0.900388	Male	-0.575811	-1.005884	Married	Never Worked	Urban	1.379345	0.003554	Non-smoker	Frequent Drinker	Moderate	-1.000533
4	-0.144127	Male	1.736682	0.994150	Divorced	Self-employed	Urban	1.182983	0.219323	Currently Smokes	Rarely	Low	-1.000533

Figure 6: The scaling of the numeric types of features

In data mining, encoding categorical data is necessary in order to make easier for computer to understand. The implementation using *one-hot encoding()* by converting each value of categorical features into a column and assign it a 1 or 0 value. Figure 7 illustrates the outcome of encoding process of two features Gender and Marital Status. Gender is a type of nominal features that consist value Female or Male. For example, since the instance #1st is Male, thus Gender_male is 1 and the Gender_Female is 0. For second feature, Marital Status consists of values Married, Single or Divorced. After encoding, 3 new columns appear for Marital Status and value 1 indicate the instance has true value for that column and the rest are 0. For example, instance #2nd Marital_Status_Single is 1, while Marital_Status_ Divorced and Marital_Status_Married are 0.

Figure 8 depicts all the final attributes selected for the next process which is predictive modelling classification using several Machine Learning algorithms.

	Gender_Female	Gender_Male	Marital Status_Divorced	Marital Status_Married	Marital Status_Single
0	0.0	1.0	0.0	1.0	0.0
1	0.0	1.0	0.0	0.0	1.0
2	0.0	1.0	0.0	1.0	0.0
3	0.0	1.0	0.0	1.0	0.0
4	0.0	1.0	1.0	0.0	0.0

Figure 7: Encoding two features of Gender and Marital Status

```
In [31]: df_stroke_ready.columns

Out[31]: Index(['Gender_Female', 'Gender_Male', 'Marital Status_Divorced',
                'Marital Status_Married', 'Marital Status_Single',
                'Work Type_Government Job', 'Work Type_Never Worked',
                'Work Type_Private', 'Work Type_Self-employed', 'Residence Type_Rural',
                'Residence Type_Urban', 'Smoking Status_Currently Smokes',
                'Smoking Status_Formerly Smoked', 'Smoking Status_Non-smoker',
                'Alcohol Intake_Frequent Drinker', 'Alcohol Intake_Never',
                'Alcohol Intake_Rarely', 'Alcohol Intake_Social Drinker',
                'Physical Activity_High', 'Physical Activity_Low',
                'Physical Activity_Moderate', 'Family History of Stroke_No',
                'Family History of Stroke_Yes', 'Dietary Habits_Gluten-Free',
                'Dietary Habits_Keto', 'Dietary Habits_Non-Vegetarian',
                'Dietary Habits_Paleo', 'Dietary Habits_Pescatarian',
                'Dietary Habits_Vegan', 'Dietary Habits_Vegetarian', 'Age',
                'Hypertension', 'Heart Disease', 'Average Glucose Level',
                'Body Mass Index (BMI)', 'Stroke History', 'Stress Levels',
                'Diagnosis'],
               dtype='object')
```

Figure 8: Final attributes constructed for next process

Training the Prediction Model

The first step of developing the model using machine learning algorithm split the attributes into features and target. The target attribute is typically an independent attribute that serves as the ultimate goal of the investigation. Meanwhile, features consist all attributes that are dependents to the target (please refer to Figure 8).

In this study, the target attribute is *'Diagnosis'* that consisting two-class values of stroke and no stroke. The coding implementation in Figure 9 demonstrates the process of splitting the stroke dataset. 80% of the dataset is allocated for training the model, allowing the algorithm to learn patterns from this subset of features and target label. Once the model was created, the validation process was conducted using the remaining 20% of testing features and label to assess the quality of the model. This validation will mitigate bias as the test data utilized for evaluation was distinct from the data employed in model development.

```
In [34]: #split for testing and training data
         # Select Features
         feature = df_stroke_ready.drop('Diagnosis', axis=1)

         # Select Target
         target = df_stroke_ready['Diagnosis']

         # Set Training and Testing Data
         from sklearn.model_selection import train_test_split
         X_train, X_test, y_train, y_test = train_test_split(feature , target,
                                                             shuffle = True,
                                                             test_size=0.2,
                                                             random_state=1)

         # Show the Training and Testing Data
         print('Shape of training feature:', X_train.shape)
         print('Shape of testing feature:', X_test.shape)
         print('Shape of training label:', y_train.shape)
         print('Shape of testing label:', y_test.shape)

         Shape of training feature: (12000, 37)
         Shape of testing feature: (3000, 37)
         Shape of training label: (12000,)
         Shape of testing label: (3000,)
```

Figure 9: The implementation of split the attributes of stroke dataset to features and target class

In this study, several algorithms were chosen to be implemented with the training data to construct models, the implementation and construction of Decision Tree Model was depicted in Figure 10, Logistic Regression model in Figure 11, Linear Discriminant Analysis model in Figure 12, Gaussian Naïve Bayes model in Figure 13 and Support Vector Machine model in Figure 14. After the models was constructed, prediction step was generated to calculate the prediction results from testing dataset.

```
In [7]:
# Create Decision Tree classifer object
dt = DecisionTreeClassifier()
# Train Decision Tree Classifer
dt = dt.fit(X_train,y_train)
#Predict the response for test dataset
y_pred_dt = dt.predict(X_test)
```

Figure 10: The implementation and construction for Decision Tree Model

```
In [18]:
#Logistic Regression
from sklearn.linear_model import LogisticRegression
# Create Logistic Regression classifer object
logreg = LogisticRegression()
# Train Logistic Regression Classifer
logreg.fit(X_train, y_train)
#Predict the response for test dataset
y_pred_logreg = logreg.predict(X_test)
```

Figure 11: The implementation and construction for Logistic Regression Model

```
In [21]:
#LinearDiscriminantAnalysis
from sklearn.discriminant_analysis import LinearDiscriminantAnalysis
# Create lda classifer object
lda = LinearDiscriminantAnalysis()
# Train lda Classifer
lda.fit(X_train, y_train)
#Predict the response for test dataset
y_pred_lda = lda.predict(X_test)
```

Figure 12: The implementation and construction for Linear Discriminant Analysis Model

```
In [22]:
#Gaussian Naive Bayes
from sklearn.naive_bayes import GaussianNB
# Create gnb classifer object
gnb = GaussianNB()
# Train gnb Classifer
gnb.fit(X_train, y_train)
#Predict the response for test dataset
y_pred_gnb = gnb.predict(X_test)
```

Figure 13: The implementation and construction for Gaussian Naïve Bayes Model

```
In [23]:
#SVM
from sklearn.svm import SVC
# Create svm classifer object
svm = SVC()
# Train svm Classifer
svm.fit(X_train, y_train)
#Predict the response for test dataset
y_pred_svm = svm.predict(X_test)
```

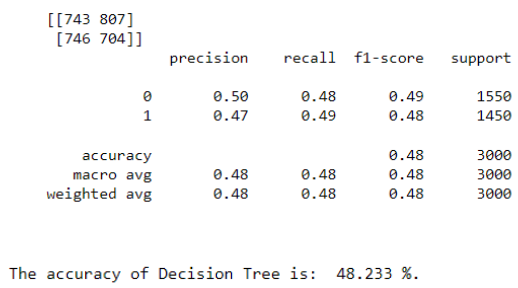
Figure 14: The implementation and construction for Support Vector Machine Model

Result and Discussion

The prediction results were gathered from all different models and evaluated using various metrics to determine how good is the predictive analytics models and find the most suited for the stroke prediction analysis. Confusion Matrix, classification report and accuracy scores were output result from the analysis and varies from all different models.

A confusion matrix has the count of the True Positive (TP), True Negative (TN), False Positive (FP) and False Negative (FN) among actual data and prediction from the ML model. A classification reports gives the full report of the classification with parameters like recall, precision, f1-score and support for the outcome class. Meanwhile, accuracy score gives the accuracy of the trained model after evaluating it using test data.

The analysis result in Figure 15, 16, 17, 18 and 19 indicate the confusion matrix of each models were the table on the left top, followed by classification report of precision, recall and f1-score in the middle where 0 and 1 represent stroke (1) and non-stroke (0) class subsequently and the last line were the result of accuracy percentage. In this study the main objective is to compare the accuracies of stroke prediction across different machine learning algorithm models. Comparing all accuracy percentage for all models, the Logistic Regression model give the highest performance of accuracy with 50.933% and outperform other 4 ML models.



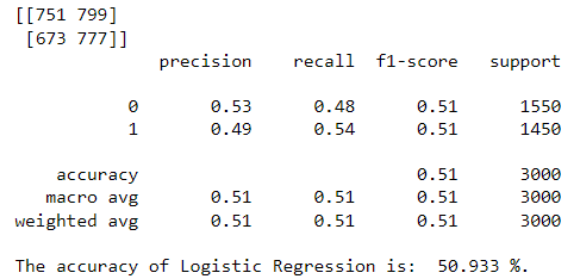
```
[[743 807]
 [746 704]]
              precision    recall  f1-score   support

           0       0.50      0.48      0.49      1550
           1       0.47      0.49      0.48      1450

    accuracy                           0.48      3000
   macro avg       0.48      0.48      0.48      3000
weighted avg       0.48      0.48      0.48      3000

The accuracy of Decision Tree is:  48.233 %.
```

Figure 15: Prediction reports from confusion matrix, classification report and accuracy of Decision Tree Model.



```
[[751 799]
 [673 777]]
              precision    recall  f1-score   support

           0       0.53      0.48      0.51      1550
           1       0.49      0.54      0.51      1450

    accuracy                           0.51      3000
   macro avg       0.51      0.51      0.51      3000
weighted avg       0.51      0.51      0.51      3000

The accuracy of Logistic Regression is:  50.933 %.
```

Figure 16: Prediction reports from confusion matrix, classification report and accuracy of Logistic Regression Model.

```
[[747 803]
 [675 775]]
              precision    recall  f1-score   support

           0       0.53      0.48      0.50      1550
           1       0.49      0.53      0.51      1450

    accuracy                           0.51      3000
   macro avg       0.51      0.51      0.51      3000
weighted avg       0.51      0.51      0.51      3000

The accuracy of LDA is:  50.733 %.
```

Figure 17: Prediction reports from confusion matrix, classification report and accuracy of Linear Discriminant Analysis Model.

```
[[750 800]
 [703 747]]
              precision    recall  f1-score   support

           0       0.52      0.48      0.50      1550
           1       0.48      0.52      0.50      1450

    accuracy                           0.50      3000
   macro avg       0.50      0.50      0.50      3000
weighted avg       0.50      0.50      0.50      3000

The accuracy of GNB is:  49.900 %.
```

Figure 18: Prediction reports from confusion matrix, classification report and accuracy of Gaussian NaiveBayes Model.

```
[[780 770]
 [719 731]]
              precision    recall  f1-score   support

           0       0.52      0.50      0.51      1550
           1       0.49      0.50      0.50      1450

    accuracy                           0.50      3000
   macro avg       0.50      0.50      0.50      3000
weighted avg       0.50      0.50      0.50      3000

The accuracy of SVM is:  50.367 %.
```

Figure 19: Prediction reports from confusion matrix, classification report and accuracy of Support Vector Machine Model.

Conclusion

In this study 5 different machine learning algorithms were chosen to be implemented with stroke dataset after rigorous pre-processing steps applied to the raw data. All of the algorithms were choosen from some variation of mechanism. For example, Decision Tree and Logistic Regression algorithms are both tree-based mechanism; Gaussian Naive Bayes and Linear Discriminant Analysis both are probabilistic statistical mechanism; and lastly Suport Vector Machine is functional-based algorithm. In the end, Logistic Regression Model gives the highest performance of accuracy which technically known as simple algorithm that suitable for binary class dataset and very similar to simple neural network. Future study will explore more possibilities of algorithm mechanism and behaviour that give strong indication of the performance on specific dataset.

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THE FRAMEWORK OF e-*SUKUKATA* BAHASA MELAYU KINDERGARTEN COURSEWARE USING ONTOLOGY-BASED TECHNIQUE

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ABSTRACT

Multimedia e-learning tools hold significant promise in enhancing learning outcomes for 4-year-old students, nurturing linguistic proficiency, memory, and critical thinking development. Learning about "suku kata terbuka" in Bahasa Melayu poses numerous challenges for 4-year-old students. Initially, their developmental stage hinders their ability to recognize these syllables, making it difficult to differentiate between open and closed syllables. While some children can pronounce consonant letters individually, the problem arises that they struggle with combining them with vowel sounds, particularly in consonant-vowel (KV) syllables. Moreover, these young learners encounter difficulties in vocabulary development. Their limited vocabulary obstructs their understanding of words containing "suku kata terbuka," affecting both reading and speaking skills. Another issue arises from the inadequacy of current vocabulary learning methods for 4-year-old Bahasa Melayu learners. Existing approaches may not cater to their needs, resulting in comprehension gaps and a lack of Malay vocabulary. Similarly, in Bahasa Melayu, students' restricted vocabulary significantly affects their learning process, highlighting the importance of effective vocabulary learning strategies. Teachers play a crucial role in implementing tailored instructional strategies, with Bahasa Melayu providing a cultural and linguistic context for linguistic exploration. Thus, this project aims to address these challenges by integrating knowledge management, system thinking techniques, and an ontology-based approach into e-learning courseware focused on "suku kata terbuka" for 4-year-old students. The comprehensive approach seeks to provide a culturally relevant educational experience, focusing on the domain of study and the specific needs of 4-year-old students. Incorporating "suku kata terbuka" in the curriculum extends beyond linguistic development, boosting students' self-esteem, enhancing system thinking, and heightening interest in learning Bahasa Melayu.

Keywords: Courseware Development, Ontology, Kindergarten, Bahasa Melayu, sukukata

Introduction

E-learning technology has ushered in a profound transformation in education delivery, offering dynamic and captivating learning environments that greatly improve learning outcomes. Teachers can enhance student learning by facilitating self-paced learning, delivering timely feedback, and customizing education through course materials. Interactive courseware plays a pivotal role in promoting efficient and effective learning, providing structured content, multimedia components, assessments, and interactive functionalities. Agno and Ponte (2013) research confirm the positive impact of interactive courseware on student performance.

Efficient knowledge management is essential in e-learning multimedia courseware, especially in kindergarten education. Educators can employ knowledge management practices to organize, capture, store, and disseminate relevant learning materials, thus establishing a comprehensive resource for students. Petrides and Nodine (2003) emphasize the promising potential of knowledge management practices in educational settings, offering a strategic framework to optimize knowledge utilization and enhance educational outcomes. System thinking techniques are crucial in designing effective e-learning multimedia courseware, particularly for kindergarten students. Incorporating system thinking into courseware significantly improves learners' critical thinking and problem-solving abilities. Westra (2008) highlights the utility of systems thinking and modeling in providing clarity and comprehension.

The Ontology-based Technique serves as a potent strategy for enhancing learning outcomes in e-learning multimedia courseware. By utilizing an ontology-based semantic framework to structure course content, students can access pertinent information and resources tailored to their individual needs and learning preferences. Rahayu et al. (2022) underscores the crucial role of ontologies in adaptive learning technology, highlighting how implementing this technique can personalize the learning experience and optimize outcomes for students.

In the context of teaching *Bahasa Melayu* to kindergarten students, e-learning multimedia courseware offers a promising avenue for improving learning outcomes. By integrating interactive elements like videos, games, and audio clips, e-learning courseware can captivate young learners' attention and make the learning process more engaging. This multimedia approach facilitates a dynamic and interactive learning experience, catering to the diverse learning styles and preferences of kindergarten students. Additionally, e-learning courseware allows students to learn at their own pace, enabling personalized learning experiences tailored to individual needs and abilities. Through interactive exercises and activities, students can actively engage in their learning, reinforcing language skills in an enjoyable and interactive manner. Furthermore, e-learning courseware provides immediate feedback, enabling students to monitor their progress and address areas needing improvement promptly.

Moreover, integrating e-learning courseware into *Bahasa Melayu* instruction can enhance access to educational resources, particularly in remote or underserved areas where traditional teaching materials may be scarce. Overall, e-learning multimedia courseware holds significant potential to revolutionize the teaching and learning of *Bahasa Melayu* for kindergarten students, fostering a more engaging, effective, and accessible educational experience.

Thus, the primary focus of this research concentrates on crafting interactive courseware tailored for kindergarten-aged students, specifically those within the 4-year-old age bracket. This work incorporates various techniques including multimedia elements, knowledge management, system

thinking, and ontology, aiming to enhance the learning experience for these young learners. The overarching goal is to facilitate the improvement of students' learning skills by integrating these techniques comprehensively.

To achieve this objective, the study proposes the development of interactive courseware designed to aid 4-year-old students in learning *Bahasa Melayu*, with a particular emphasis on *sukukata tebuka*. The specific aims of this study are outlined as follows:

i. Identifying the requisite teaching and learning requirements for *sukukata terbuka* in *Bahasa Melayu* among kindergarten students.
ii. Designing and implementing *Bahasa Melayu* courseware utilizing ontology-based techniques tailored to 4-year-old learners.

The subsequent section will explain an exploration of related work within the range of e-learning technology. Following this, the study will present the methodology framework employed. Finally, the paper will conclude with a summary of the study.

Related Work

Multimedia courseware is crucial in improving e-learning experiences for 4-years-old kindergarten students studying *suku kata terbuka* in *bahasa melayu*. Interactive games featuring *suku kata terbuka* exercises, for example, can create engaging and dynamic platforms for youngsters to learn phonetic ideas. Through interactive, multimedia-rich courseware, this technique not only catches attention but also caters to varied learning styles, developing a more comprehensive grasp of *suku kata terbuka*.

i. Assistive Courseware

When learning *suku kata terbuka* in *bahasa melayu*, assistive courseware plays a critical role in improving the e-learning experience for 4-years-old kindergarten students. For example, interactive multimedia tools such as “Belajar Mengeja ABC, Perkataan”, “Belajar Membaca Tanpa Mengeja”, and “Belajar Menulis ABC, Suku Kata” provides a gamified approach by mixing audio-visual features and interesting exercises. These assistance technologies create a multisensory learning environment that caters to different learning styles while also grabbing the interest of young learners. According to Chua et al. (2019), such multimedia interventions have a positive influence on preschoolers' *suku kata terbuka* understanding and retention. The previous study said that relevance of age-appropriate content and interactive features in maintaining children's interest and generating a pleasurable learning experience. Using these findings, the design and deployment of assistive courseware is critical in optimizing the language learning experience for 4-years-old students in the context of *suku kata terbuka* instruction in *bahasa melayu*.

ii. E-Learning

E-learning has emerged as a promising option for supporting early language development, notably in the context of multimedia courseware for *suku kata terbuka* in *bahasa melayu* for 4-years-old kindergarten students. Interactive e-learning tools are beneficial in engaging young learners and improving their linguistic skills and the value of age-appropriate multimedia information, emphasizing its favorable impact on toddlers' comprehension and memory of linguistic concepts. These studies provide important insights into the design and execution of e-learning strategies that are tailored to the needs of young children in the realm of *suku kata terbuka* education.

a. Web-based E-Learning Applications

A web-based e-learning application is a web-based educational platform or system that allows users to engage in learning activities, access resources, and participate in courses online. Multimedia content, interactive modules, evaluations, and collaboration tools are common components. Web-based e-learning applications emphasize content and activity delivery via web browsers and technology-based eLearning applications use various technologies to enhance the learning experience, going beyond traditional content delivery methods. Within the larger landscape of e-learning, each serves a distinct purpose. Examples of Web-based E-Learning Applications as shown below (in Figure 1).

Bahasa Melayu Suku Kata KVKKV (Wordwall)
https://wordwall.net/ms/resource/1767797/bahasa-melayu-suku-kata-kvkkv

KV+KV&V+KV (a-r) (Wordwall)
https://wordwall.net/ms/resource/18853809/kvkv-vkv-a-r

KV+KV+KV (3 suku kata terbuka) (Wordwall)
https://wordwall.net/ms/resource/19167523/kvkvkv-3-suku-kata-terbuka

SlideShare: (Sistem Ejaan Suku Kata Terbuka & Tertutup)
Suku kata (Terbuka & Tertutup) | PPT (slideshare.net)

Figure 1: Web-based E-Learning Applications

b. Technology based E-Learning Applications

Educational tools and platforms that use digital technology to enable the delivery of educational information and resources are referred to as technology-based e-learning applications. To enhance the learning experience, these programmed frequently incorporate multimedia elements, interactive capabilities, and online connectivity. Technology based E-Learning Applications can include various technologies like mobile applications or desktop software. Examples for Technology based E-Learning Applications as shown below (in Figure 2).

Courseware Development Framework

This project aims to explore "*suku kata terbuka*" for 4-year-old students, incorporating knowledge management and system thinking techniques, alongside an ontology-based approach, as essential components of e-learning courseware. In *Bahasa Melayu*, "*suku kata terbuka*" refers to syllables ending with a vowel sound without a subsequent consonant, where the vowel sound is pronounced distinctly, contributing to the language's rhythmic flow. Ahmad and WA (2012) study identified such syllables through instrumental phonetic analysis.

Within this project, teachers, 4-year-old students, *Bahasa Melayu*, and the concept of "*suku kata terbuka*" are central. Teachers play a pivotal role in implementing effective instructional strategies tailored to meet developmental needs and ensure engagement. *Bahasa Melayu* provides a cultural and linguistic context, emphasizing language acquisition, with "*suku kata terbuka*" serving as a focal point for linguistic exploration.

Kahoot: Suku Kata Terbuka
https://quizizz.com/admin/quiz/5e7c454a67671c001b3dc036/bahasa-melayu-suku-kata

Belajar Mengeja ABC, Perkataan Courseware
https://play.google.com/store/apps/details?id=com.syumulstudio.belajarmengejaabc

Belajar Membaca ABC Tanpa Mengeja Courseware
https://play.google.com/store/apps/details?id=com.solitekids.secilmembaca

Belajar Menulis ABC, Suku Kata Courseware
https://play.google.com/store/apps/details?id=com.syumulstudio.belajarmenulisabc

Figure 2: Technology based E-Learning Applications

The ADDIE (Analysis, Design, Development, Implementation, Evaluation) model was employed in this project to develop multimedia courseware for 4-year-old students learning *Bahasa Melayu*, with a specific focus on *sukukata terbuka.* The evaluation phase assesses the effectiveness of instructional strategies, allowing for iterative adjustments to enhance the learning experience for these young learners. Table 1 is the outlines of the project framework for the development of the *e-sukukata* courseware.

This holistic approach aims to offer a culturally relevant educational experience for 4-year-old students in *Bahasa Melayu* and "*suku kata terbuka*" learning. The courseware focuses on two main elements: the domain of study (knowledge management, system thinking technique, ontology-based technique) and the needs of 4-year-old students.

The significance of incorporating "*suku kata terbuka*" in the *Bahasa Melayu* subject for 4-year-old students extends beyond linguistic development. Firstly, it enhances students' self-esteem as they grasp linguistic concepts, fostering a positive attitude towards learning. Additionally, exposure to "*suku kata terbuka*" enhances students' system thinking by encouraging cognitive processes associated with language structure and pattern recognition, laying the foundation for broader cognitive development. Furthermore, integrating "*suku kata terbuka*" into the curriculum heightens students' interest in learning *Bahasa Melayu*, making the learning process enjoyable and stimulating.

Table 1: Project Framework

Phase	**Objective**	**Activity**	**Outcomes**
Analysis	1. Identify the current understanding of 4-years-old regarding "*Suku kata terbuka*." 2. Assess the learning environment and potential challenges. 3. Understand the cognitive development and preferences of 4-years-old.	1. Conduct an interview with educators. 2. Observe kindergarten classes to gauge students' current knowledge. 3. Review literature on child development and early language acquisition.	1. Clear understanding of the baseline knowledge and challenges. 2. Insights into the learning preferences and cognitive abilities of 4years-olds. 3. Initial data to inform the design phase.
Design	1. Develop a blueprint for the eLearning courseware. 2. Design engaging and appropriate multimedia elements. 3. Create a user-friendly interface for easy navigation.	1. Brainstorm and sketch the course structure and content flow. 2. Design colourful and visually appealing animations. 3. Create wireframes for the e-learning platform.	1. Detailed course structure and content plan. 2. Engaging multimedia elements designed for 4years-olds. 3. User-friendly wireframes for the courseware.

Development	1. Bring the design to life by building interactive modules. 2. Incorporate appropriate content and language. 3. Conduct usability testing with the target audience.	1. Develop interactive games and activities. Create animated characters and scenarios. 2. Test the courseware with small groups of 4-years-olds for feedback.	1. Fully functional and interactive elearning modules. 2. Appropriate content integrated into the courseware. 3. Usability testing feedback for further improvements.
Implementation	1. Deploy the e-learning courseware in kindergarten settings. 2. Train educators on how to facilitate its use.	Provide ongoing support to educators.	1. Educators proficient in using the elearning courseware. 2. Smooth integration into the curriculum. 3. Identified areas for continuous support and improvement.
Evaluation	1. Assess the effectiveness of the eLearning courseware. 2. Measure learning outcomes and engagement. 3. Gather feedback from educators, parents, and students.	1. Analyse assessment 2. results and user engagement metrics. 3. Collect feedback through surveys and interviews. 4. Iterate on the courseware based on evaluation findings.	1. Clear understanding of the courseware's impact on learning. 2. Identified areas for enhancement based on feedback. 3. Revised and improved eLearning courseware for sustained effectiveness.

Open syllables in *Bahasa Melayu* are syllables that end with a vowel sound without any subsequent consonant sound, contributing to the language's smooth cadence. Effective knowledge management is crucial in e-learning multimedia courseware for the *Bahasa Melayu* subject, aiding in organizing and providing easy access to course content. System thinking techniques play a crucial role in fostering an understanding of open syllables among students. An ontology-based technique serves as an effective strategy to improve learning outcomes, categorizing open syllables under themes such as Animals and vowels "A."

The use of multimedia e-learning tools for the *Bahasa Melayu* subject holds significant promise in enhancing learning outcomes for children as young as four years old, facilitating not only linguistic proficiency but also memory and critical thinking development.

Conclusion

In conclusion, the systematic application of the ADDIE model offers a comprehensive framework for developing e-learning courseware tailored to the specific requirements of 4-year-old kindergarten students learning *sukukata terbuka* in *Bahasa Melayu*. Commencing with the Analysis phase, a thorough understanding of learners' cognitive development, preferences, and learning environment is established. The Design phase constructs a blueprint integrating vibrant multimedia elements and a

user-friendly interface, mindful of the young audience's unique traits. During Development, interactive modules and relevant content are generated, with usability testing ensuring alignment with educational objectives. Implementation involves educator training and seamless integration into the curriculum. Lastly, the Evaluation phase, segmented into areas such as User Interface, Functionality, Navigation, Activities, and Multimedia Elements, critically evaluates overall effectiveness and user satisfaction. Surveys, observations, and analytics yield valuable insights, driving iterative enhancements in interface design, functionality, navigation clarity, activity engagement, and multimedia integration. This holistic approach guarantees a refined and optimized e-learning experience, ultimately augmenting *sukukata terbuka* instruction effectiveness for 4-year-old *Bahasa Melayu* learners.

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e-HISTORY MOBILE APPS FOR SPM CANDIDATES: A FRAMEWORK

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ABSTRACT

Technologies and software are used to design, deliver, and support learning activities. With the advancement of technology in the world, individuals utilize technology in every aspect of their lives. E-learning is the use of electronic technologies to deliver educational content and activities. E-learning frequently has connections with education since it is another way of conveying knowledge more conveniently. In the Malaysian context, the History subject is one of the subjects studied by Malaysian students for Sijil Pelajaran Malaysia (SPM). SPM history covers a wide range of topics and elements of Malaysian and global history. This subject must be passed to earn SPM certificate, as it a requirement set by the Malaysian government. Manual learning materials which may be uninteresting lead to the development of the e-History Mobile Apps to help SPM candidates to get more interested in learning this subject. Questionnaires, studies, and interviews were done to SPM History teachers and candidates from SMK Seri Samudera and feedbacks were obtained.

Keywords: e-learning, history, mobile apps

Introduction

E-learning is the use of electronic technologies to deliver educational content and activities. E-learning is frequently used to refer to a variety of different forms of digital learning, including online and virtual education (Alebeisat et al., 2022). E-learning is considered as the acquisition of knowledge in an electronic form using personal computers, smartphones, tablets (Bakanova & Javorcikova, 2020). Learners can gain numerous benefits from elearning, including customization, flexibility, simplicity, accessibility, and interaction. hand."

Considering the letter "e" stands for "electronics", technology is particularly crucial in e-learning. Technologies and software are used to design, deliver, and support the learning activities. Mobile devices are one example that are commonly used in daily life, whether at home, school, or work. Mobile learning, adaptive learning, gamification, and AI are all possible with technology. A growing

number of people are using mobile devices in their daily lives because of the development of increasingly advanced technologies.

E-learning frequently has connections with education since it is another way of conveying knowledge more conveniently. In Malaysia, the History subject is one of the subjects is a compulsory subject in secondary school and this subject must be passed to earn SPM certificate. SPM history covers a wide range of topics and elements of Malaysian and global history. The aims of learning history subject is to educate future generations about what has occurred, what an important figure or an association is fighting for to achieve something precious. It is meticulously documented to keep track of important events and avoid unpleasant incidents. Furthermore, learn history may extend perspective, knowledge and teach valuable skills such as critical thinking.

The current practice of learning history subject is using textbooks provided by the Malaysian government, which is the standard procedure. One of the greatest advantages of using textbooks is that they are psychologically necessary for students because their growth and accomplishment can be tracked concretely when they are being used (Hycroft, 1998). However, textbooks can be challenging to understand, especially for those who are not enthusiastic readers. Besides that, it is lengthy and the explanations in the textbook make history tedious, leading to disinterest among students. The shortage of time forces the teachers to speed up the lesson in class, leaving little room for in-depth explanation or student engagement.

Therefore, e-History Mobile Application for SPM candidates will be developed to provide great possibilities and opportunities for students to be interested in the subject of History. It also has the potential to boost student enthusiasm and participation by providing more alternatives, diversity, and interactivity in the learning process.

Project Scope

The project's scope is divided into three major components: the project's target user, the documentation of the syllabus used and the equipment that will be used to construct the eLearning application. Users are primarily students, particularly those preparing for the SPM form 4 and form 5 examination. The project would not be possible without them. Therefore, they are an integral part of the project. Because these SPM candidates are of two different ages, their syllabuses are likewise diverse. The topics chosen are those selected by students in forms 4 and 5 via questionnaires. The students received a question that required they had to provide an answer to a difficult-to-understand topic, and after conducting research and analysis on their responses, it was discovered that there were three topics.

Figure 1 shows the syllabus for form 4 and form 5 History subject. In this project, form 4 students will focus on chapter 2, "The Importance of Nationalism," as their main topic. Because these are students who will be sitting the SPM soon, form 5 will focus on two different chapters. As a result, they require extra attention. The topics that receive more attention are chapter 8: Building National Prosperity and chapter 9: Malaysia's Foreign Policy.

Figure 1: The topics in History SPM books

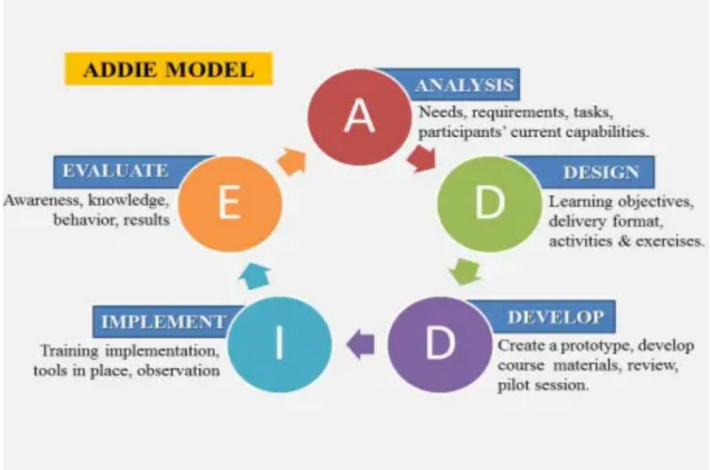
Finally, the implementation of the appropriate tools can aid in the creation of a well-organized application. EdApp, Adobe Animate or Android Studio are tools for developing applications. This software will be helpful in the development of applications that will be built soon.

Methodology

A well-defined and appropriate methodology will guide how the project is executed and reduce the chance of failure. The ADDIE Model and Cognitive Learning Theory was chosen as the technique.

ADDIE Model

According to Holden (2015), one of the models that establishes a generic, systematic, dynamic, and adaptable instructional design approach that is commonly used in instructional design for effective learning is ADDIE. Figure 2 shows the steps in ADDIE Model.



(Source: https://hortmonvera.wordpress.com/2015/03/06/addie-instructional-model/)

Figure 2: Steps in ADDIE Model

Analysis

The main objective is to assess the requirement for developing teaching purposes. Define the setting in the learning environment, as well as the educational requirements and objectives of the target audience. According to Adesfiana, Asturi and Enawaty (2022) there are two specific levels which is content needs analysis based on the syllabus (curriculum) and software requirements analysis (software).

Design

The objective is based on research, to create a blueprint or storyboard for the course or instructional materials. Providing content, structure, and methods of instruction are all part of the steps.

Development

The objective is based on the design strategy, creating actual learning resources. A reference study is carried out as a reference in preparing material on the learning media to be developed. (Sumarwati et al., 2020). This was the step in which the parts chosen during the design phase were prepared.

Implementation

The objective is to provide the course or training programme to the learners. By providing the learning environment that attracts individuals, the learning solution is completed. When a lesson has been established and set up, it is required to be pilot tested.

Evaluation

Evaluation is the process for determining the probability the system is learning to develop effectively, according to with development expectations prefix. According to Dick, Carey, and Carey (2015), there are two types of evaluation to evaluate the design of instruction: formative evaluation and summative evaluation. Formative evaluation focused at creating rapid improvements while summative evaluation

carried out the conclusion of a programme, project or instructional design to evaluate it is entire efficacy and success.

Cognitive Learning Theory

Cognitive theory is the study of the information processing of the mind. It is a theory for explaining how the cognitive load placed on our working memory influences learning and information processing. According to Brayadi et al., (2021), learning will be successful if it is in accordance with the stages and provisions that exist in each character of cognitive learning patterns in students. Table 1.2 shows description of cognitive load theory principles.

Table 1.2: The description of Cognitive Load Theory Principles

Principle	Description
Chunking Information	Chunking is the process of breaking down large amounts of information into smaller, more manageable pieces. This minimizes cognitive strain and allows learners to process information more efficiently.
Reduce Extraneous Load	Extraneous load is the cognitive load resulting from irrelevant or unneeded factors in the learning environment. Reducing insignificant load frees up memory resources for processing critical information
Utilize Visuals Effectively	Illustrations may represent information more effectively than text alone, lowering cognitive load by shifting processing from the verbal to the visual channel.
Manage Intrinsic Load	Intrinsic load is the intrinsic complexity of the material being given. Effective instructional design requires balancing the level of intrinsic load to the learner's abilities and past knowledge
Utilize Multimedia Principles	Multimedia learning concepts emphasize the use of several sensory modalities to improve learning outcomes while reducing cognitive load
Provide Clear Navigation	Clear navigation pathways guide learners through the learning material in a logical and sequential order, minimizing the mental effort involved with knowledge retrieval and orientation

Conclusion

E-learning projects can be implemented as learning resources. Since e-learning is a hybrid and online system, it enables students to receive high-quality education at any distance and anytime with condition; must have internet connection. Learning history subject is crucial as it is a compulsary subject in secondary school and students need to pass the subject to obtain Sijil Pelajaran Malaysia (SPM) certificate. Therefore, the development of e-History Mobile Application for SPM candidates with great possibilities and opportunities for students to be interested in the subject of History. It also has the potential to boost student enthusiasm and participation by providing more alternatives, diversity, and interactivity in the learning process. Students, for example, can select from a variety of topics that match their passions, demand, and preferences, as well as interact with other students from various backgrounds, cultures, and race.

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e-MATHJR EDUCATION FOR KINDERGARTEN: A FRAMEWORK

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ABSTRACT

E-learning can be viewed as a natural development of remote learning, which has always benefited from the newest tools to appear in the environment of technologies for conducting education. Various subjects can be applied to e-learning which allow students to engage with educational materials in a playful and dynamic way. One of it is the mathematics subject. The area of mathematical development starting from early childhood is important to a child's progress in primary and post-primary education. Kindergarteners will practice basic concepts of math, reading, writing, shapes, and so on. To replace the traditional learning methods in Mathematics, e-MathJr Education for Kindergarten was being developed. ADDIE Model is used in the system development. This mobile application will provide kindergarteners with an interesting and more engaging learning application through instant and personalized feedback.

Keywords: e-learning, kindergarten, mathematics, application

Introduction

Game-based learning is not just creating games for students to play, it is designing learning activities that can incrementally introduce concepts, and guide users towards an end goal (Pho & Dinscore, 2015). A mobile application, most referred to as an app, is a type of application software designed to run on a mobile device, such as a smartphone or tablet computer. Mobile applications frequently serve to provide users with similar services to those accessed on PCs (Rouse, 2020).

Kindergarteners are children age 4-6 years old, who attend kindergarten, which is typically the first year of formal education in many countries. Kindergarteners will learn and practice many lessons and learning mathematics is crucial so that they can learn and understand basic concepts before they go to primary school.

Most kindergarten use a manual learning method in the classroom, which involves books. Some students may also become disengaged in such environments due to the lack of individual attention and engagement that does not meet their learning needs. This traditional method may also have some other difficulties as students require more assistance from the teacher, unable to receive immediate feedback

since traditional teaching or learning approaches do not provide each child with appropriate observations and difficult for parents to monitor their child's performance so they are not aware of their child's learning progress and are unable to assist them in getting better at the topic.

Thus, to overcome this problem, a learning mobile application was being developed to make learning more interesting and create a more engaging learning application. The benefit of developing an e-MathJr application for kindergarteners is to solve math problems faced from the current practice. The project's goal is to improve kindergarten students' cognitive development because by doing visual math exercises, it can have an impact on their ability to reason, investigate, and solve problems. It also promotes critical thinking, logical reasoning, and problem topics to actual circumstances, giving them greater significance and relevance to a child's everyday existence.

Project Scope

The upcoming e-MathJr application aims to address the syllabus content related to addition and subtraction designed for six-year-old kindergarten students. The scope of the user for this application involves the kindergarten students and parents.

Kindergarteners

To make learning more enjoyable, children can access the system and play a variety of activities provided, such as puzzles with dynamic background music and eye-catching graphics. Scores can be reviewed to evaluate their performance on the activities done.

Parents

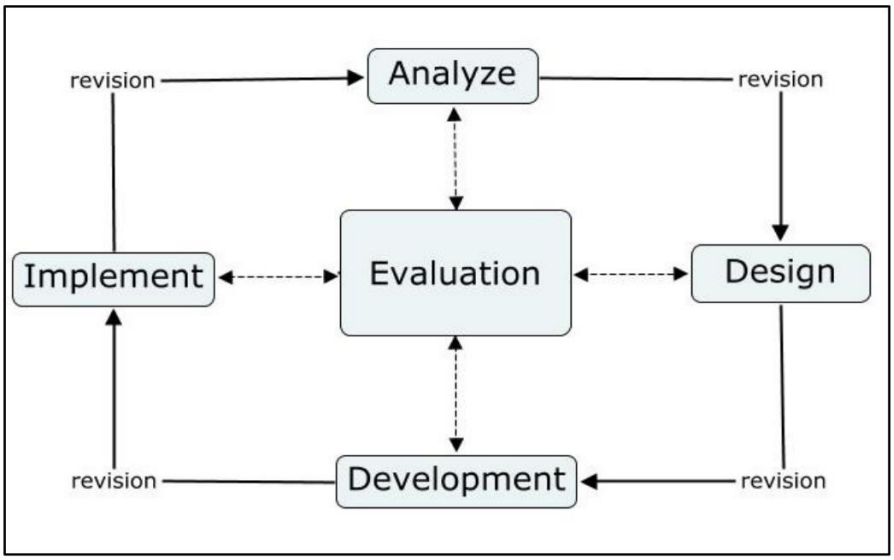
In order to provide children with additional help on the parts that they are unable to understand, parents can assess their child exercise scores. Parents may also monitor how frequently the system is being used by the children to learn the subject matter and complete exercises.

Methodology

In producing a good instructional design, there are various theories and models presented by instructional design researchers such as the ADDIE model and Jean Piaget's Cognitive Development Theory.

ADDIE Model

The stages in the ADDIE Model involves preliminary study, analysis, design, development, implementation, evaluation, and report. Figure 1 shows stages of ADDIE model.



(Source: Kurt, 2019)

Figure 1: Phase in ADDIE Model

The project framework of e-MathJr application will be using the ADDIE Model which consists of seven stages. The method will be applied to define progress that will be needed to complete the project by modifying the process. Table 1.1 shows the phase that will be needed to complete the project.

Table 1: Project Development Methodology of e-MathJr

Phase	Activity	Outcome
Preliminary Study	◆ To choose a suitable project title for the design and development of the application. ◆ To choose an application name for the project. ◆ Conduct the interview session. ◆ Identify the current problem in math subject for kindergarten	◆ The title of the project "Exploring Mathematical through E-Learning for Kids" identified. ◆ The application name of the project "e- MathJr". ◆ The interview session with a former kindergarten teacher
Analysis	◆ Collecting data requirement. ◆ Find suitable material for kindergarten mathematics syllabus.	◆ Information regarding kindergarteners' mathematics subject. ◆ The content requirement of the e-MathJr application will be decided.

Design	◆ The e-learning application will be delivered to CD-ROM or play-store.	◆ The application will be written to the CD- ROM or will be launched on the play- store.
Implementation	◆ To test the functionality of the application.	◆ Functionality of the application will be tested.
Evaluation	◆ Writing the project report	◆ Full project report will be done.

Jean Piaget's Cognitive Development Theory

The constructivist learning theory of Jean Piaget will be employed in the development of the Mathematics for Kindergarten (e-MathJr) application, facilitating the interpretation of information in an interactive manner. The guidelines from Jean Piaget's constructivist learning theory will inform the blueprint of the mathematics application throughout the developmental process. The design will be structured and the process will be iterative, ensuring ease of comprehension for designers, developers, parents, and kindergarteners in understanding

Each child goes through the stages in the same order (but not all at the same rate), and child development is determined by biological maturation and interaction with the environment. At each stage of development, the child's thinking is qualitatively different from the other stages, that is, each stage involves a different type of intelligence (Mcleod, 2023). To get the best results in the educational process, all of the components in education should be involved, especially educators who always had to adapt to students' development. There are phases in children's development according to Jean Piaget's.

Sensorimotor stage

The sensorimotor stage is the period of development from birth through age two. During this initial phase of development, children utilize skills and abilities they were born with (such as looking, sucking, grasping, and listening) to learn more about the environment. In other words, infants and young children experience the world and gain knowledge through their senses and motor movements. Through trial and error, children discover more about the world around them (Cherry, 2023).

Operational stage

This stage includes the emergence of motor skills and language. At the age of two, children enter the operational stage, where their ability to use mental representations, rather than the physical 17

appearance of objects or people, improves greatly. In this stage, children also learn more about categorization.

Concrete operations stage

Children think logically about concrete events. The concrete operation stage is expressed by the development of a system of thought based on events that are directly experienced. During this stage, children begin to understand the concept of conservation; understanding that, although things may change in appearance, certain properties remain the same (Mcleod, 2023).

Formal operating stage

The formal operational stage begins between around 11-12. Children are usually in grade school around this time. In the formal operational stage, children tend to reason more abstractly, systematically, and reflectively. They are more likely to use logic to reason out the possible consequences of each action before carrying it out (Mcleod, 2023).

Conclusion

Learning mathematics in traditional methods is common in most kindergarten. Thus, to enhance the learning method, e-Math Junior mobile application for kindergarteners was being developed. This system can help kindergarteners to develop early numeracy skills like comparing quantities and 5 perceiving numbers as patterns. Besides, these abilities also serve as a building blocks for higher-level math. Furthermore, the system that will be developed will help parents to able to track their child's learning progress easily, anywhere. This can help parents to understand more about their child and be able to guide their child with extra exercises to sharpen their child's knowledge for the subject. The application follows the ADDIE model, considering stages like analysis, design, development, implementation, and project evaluation throughout its creation. The project is based on the constructivist learning theory, emphasizing Jean Piaget's cognitive development theory. This method ensures that the Mathematics for Kindergarten e-MathJr program is of the highest quality, conceptual, architectural, development, and deployment phases.

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FRAMEWORK DEVELOPMENT FOR ENGLISH PORTAL FOR 6 YEARS OLD

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ABSTRACT

Since English is a language that is widely utilized in communication on a global scale, speaking English is so important. Through this English portal, students can enhance their English speaking, listening, writing, and reading skills in a controlled and interactive environment. This comprehensive approach strengthens students' language skills while also helping them become more fluent and understanding. The six-year-old "English Portal" system is a ground-breaking and significant early childhood education project. The portal is a groundbreaking and significant effort in early childhood education. Through a smooth integration of learning and fun, the system hopes to completely transform how young students interact with the English language. This project is important because it can provide children with a thorough, engaging, and joyful learning experience that will help develop their foundation in language. With its all-encompassing approach to language instruction, the program plays a critical role in providing students with the tools they need to successfully communicate in a global setting. This E -history application is being developed with the use of the ADDIE approach. A Gantt chart was utilized for this project to forecast the estimated time and ensure that the deadline was met.

Keywords: e-learning, ADDIE model, English education, portal, courseware

Introduction

The current method of studying English still entails attending topic classes on a daily basis in the traditional way. But in this new digital world, it can often be challenging for young children to fully engage in and prepare for English language acquisition using this traditional learning approach. Nearly all students now own a device, indicating children's growing affinity towards technology. There are numerous ways that using technology in the classroom can engage kids' senses.

Today's issue is that traditional classroom instruction might occasionally find it difficult to properly engage students and get them ready for the acquisition of the English language. This came about as a result of the significant changes made to the contemporary learning environment. English instruction in traditional classrooms overemphasises the role of the instructor by placing them at the centre of everything and primarily relying on what the students have learnt in class. As a result, students

play a passive role. Students participate passively in class education because they have different interests and paces, and professors are unable to accommodate every student's demands. Elcullada et al. (2021) claim that traditional teaching methods are still used in schools, with the teacher presenting the subject and the pupils being expected to pay attention and comprehend. Online learning or learning using information technology might be one of the learning solutions in the current rising trend.

Besides that, lack of concentration as well as an over-reliance on written or printed assignments that don't involve students in any way. According to Chou et al. (2017), less interesting learning for students can have an impact on lack of motivation and interest in learning new things. High motivation in learning is one of the keys to success in learning new things. The lack of student learning motivation is one of the problems that needs to be solved by giving new learning trends. The flexibility and customisation that interactive e-learning platforms provide are absent from paper-based tasks. People learn at different rates, and interactive technologies can adjust to meet those requirements by offering more challenges or support when needed.

This English Portal is design especially for years six children. Clothes, transportation, and animals are the three primary themes from the English Language syllabus core of this portal. There are exercises and notes available for the students on every topic. This portal's content was provided in Malay-English. This approach might aid students in improving their English language skills and teaching them how to form cohesive sentences. On e-learning platforms, students can get a range of resources that could help them learn better, such as exercises, notes, quizzes, and interactive lectures. Students can gain a thorough comprehension of the subjects being taught by approaching learning from multiple angles. E-learning interface design is an essential element that needs to be enhanced in order to facilitate communication between the system and users (Nordin et al., 2021).

Literature Review

Teaching, the process of ingraining moral principles in the mind, or character development are further definitions of education. Definition of education is the act of teaching, the practice of instilling moral values in the mind, or the development of character (Abosede & Sotonade, 2022). Education also made a big difference in a country's progress. Countries that did not prioritize education faced the danger of lagging behind those that did. A country's growth might be determined by looking at the percentage of its inhabitants with a decent education.

Speaking multiple languages has become increasingly important for mutual respect, understanding, and international cooperation because of globalisation. Acquiring multiple language proficiency can help students become more employable and improve their social and intellectual lives. Research indicates that studying a language improves cognitive abilities and that being bilingual gives one an advantage in the labour market. English education is the process of teaching and learning the

English language, including its syntax, lexicon, literature, and other skills. English is often taught as a second language (ESL) or as a foreign language (EFL), based on the linguistic background of the students. English is now widely utilised in practically every aspect of daily life on the planet.

The course software covered in this article worked well for one particular application that assessed the user's English learning commitment and competency. Utilising an e-learning site within an e-learning environment made sense given the state of technology today. Using course software was one way to improve the effectiveness and engagement of the teaching and learning process. This student-focused online learning environment encourages self-directed learning. An integrated e-learning site offers a complete learning environment with a range of taught and evaluation methodologies, remediation, feedback, and customised content adaptation. Utilising multimedia technology has become crucial for making learning more dynamic, captivating, and excellent (Indah Septiani et al., 2020).

Online, virtual, distributed, networked, and web-based learning are just a few of the many terms that make up e-learning. Since the term "electronic" is represented by the letter "e" in e-learning, any educational activities conducted by people or groups working online or offline via networked or freestanding computers and other electronic devices would fall under this category (Chitra & Raj, 2018). E-learning materials include interactive multimedia presentations, webinars, virtual classrooms, online courses, and digital resources spanning a wide range of subjects and educational levels. This kind of learning gives users flexibility in terms of timing and location, as well as remote access to educational resources.

Methodology

The constructivism learning theory adaptation in Designing and Developing English Portal for 6 years old was based on the ADDIE Model. According to the ADDIE paradigm, software development is a continuous procedure that starts at project selection and concludes upon development of all exploits (Taufiq et al., 2018). The procedure of the ADDIE model was modified in order to apply the technique to ascertain the total amount of work needed to complete the project. The five steps of the ADDIE paradigm are shown in Figure 1.

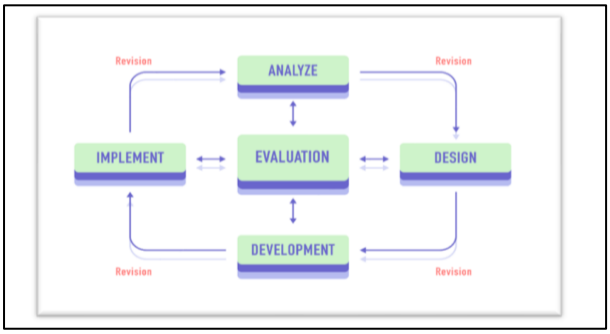

Figure 1: ADDIE Model

To graphically portray the project planned throughout time and keep track of all actions, gantt charts will be utilized in project management as shown in the figure 2 below.

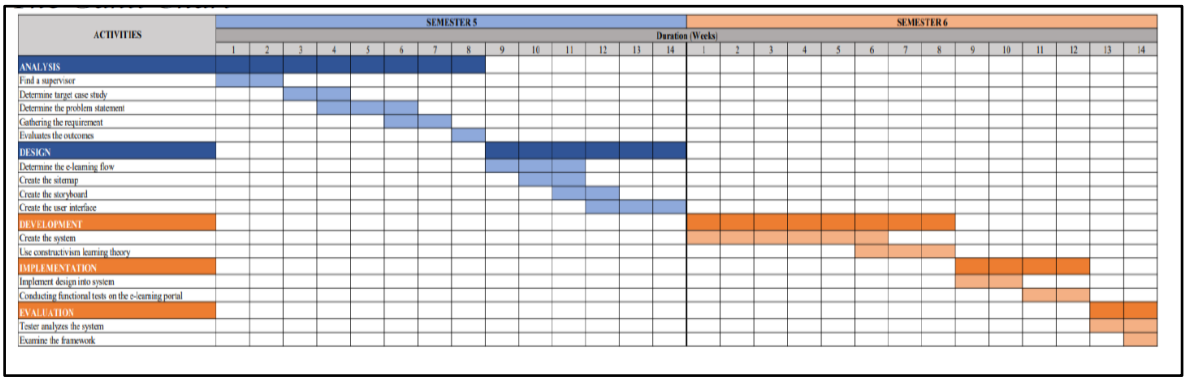

Figure 2: Gantt chart for English Portal

Constructivism is an educational theory that suggests that by mentally creating objects, students actively generate their own knowledge and perception of the universe. According to constructivist learning theory, "context," "collaboration," "conversation," and "meaning construction" are the active builders of meaning rather than the passive recipients of imposed objects and external inputs (Wen et al., 2021). Cognitive education, or improving students' experiences by utilizing prior knowledge, is the first part of constructivism theory.

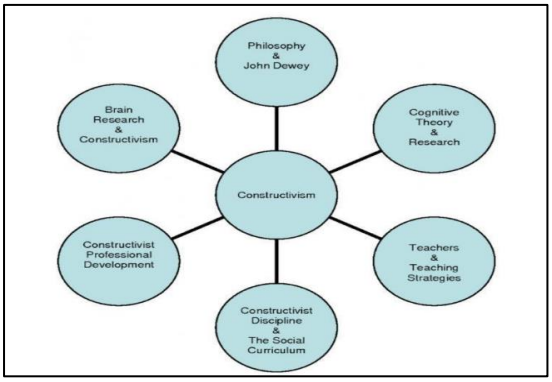

Figure 3: Constructivist Learning Theory

Conclusions

The English portal is different from traditional educational methods. It makes learning enjoyable and culturally appropriate by utilizing technology. It promotes children's active engagement, critical thinking, and love of learning. It imparts knowledge beyond language alone. It also makes learning

more enjoyable for kids. This portal shows how cutting-edge, kid-centered techniques can revolutionize the way our youngest language learners pick up languages in the future.

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DEVELOPMENT OF E-HISTORY APPLICATION FOR STPM STUDENTS

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ABSTRACT

One kind of formal education that makes use of electronic tools like computers and mobile phones is known as e-learning approch. History subject is one of the most difficult subject and it is still taught in classrooms using the traditional method, which involves studying textbooks and modules. This study addressed several issue statements, including the use of official vocabulary and complex terminology, classroom boredom, and a shortage of instructional resources, to achieve its goal. This E-History Application was developed specifically for Form 6 students to solve those problems. This E-History Application can also provide history teachers with professional development opportunities that keep them up to date on the latest research in the field and cutting-edge teaching strategies. The main aim of this application is to develop an extensive and easily navigable learning platform focused on history topics. Using this application in classes will provide a flexible and dynamic way to teach, meeting the needs of different kinds of students and raising the standard of education overall. This E -history application is being developed with the use of the ADDIE approach. A Gantt chart was utilized for this project to forecast the estimated time and ensure that the deadline was met.

Keywords: e-learning, ADDIE model, history subject, application

Introduction

E-learning has grown in Malaysia in part due to the exceptional COVID-19 pandemic epidemic. Online learning and education are becoming necessities, as noted by Professor Dr. Abdul Karim Alias, Director of the University Sains Malaysia (USM) Centre for Development of Academic Excellence (CDAE). Because of this, many students have already participated in e-learning during their two years of COVID-19 education. Whether in elementary or high school, the majority of kids already have devices that they use regularly for daily tasks. They are spending more time playing with their gadgets than they are playing outside with friends.

Electronic learning, also known as e-learning, is a teaching approach that simplifies learning and information acquisition by utilising digital resources and technology advancements. All educational endeavours that leverage electronic technology to support them are referred to as e-learning, and they

can be used both in traditional classroom settings and online (Coman et al., 2020; Rahayu & Wirza, 2020). Through digital platforms that are regularly made available online, it allows students to engage in interesting tasks and access instructional resources. There is interaction between students, teachers, and content in e-learning. Teachers and students interact in a way that promotes learning throughout this process (Hussaeni et al., 2020). Educators' capacity for managing the learning process will determine how effective the lessons are. When the goals of the learning are accomplished, learning is considered effective. Teachers must be able to select the appropriate media, techniques, and strategies based on the content to be taught in order for learning to be effective.

Personalised learning is possible with e-learning. Students can use their smartphones to work and learn at their own pace. Learning is expected to grow more successful through the use of e-learning, improving the traditional learning method and providing a way to maximise learning outcomes (Najuah, Ricu Sidik, 2021).

There are findings show that the design and execution of e-learning as a solution for history classes falls into the good category since it can support the study of history in a wider range of contexts, such as through the utilisation of local and virtual museums (Mahadin et all., 2022).

STPM students face difficulties because the materials contain formal language and complicated vocabulary. The learner has trouble picturing historical occurrences. Most schools continue to follow the outdated methodology, and pupils mainly learn about the past in order to pass exams. They could find it more difficult to comprehend what transpired as a result. When reading historical books that are primarily constituted of text, students could have trouble visualising the people and events being discussed unless visual aids like maps, diagrams, or photographs are used. As a result, individuals could have trouble visualising the historical events they have learned. Traditional history textbooks with their voluminous text and dearth of visual aids could make students bored. Moreover, it is often a challenge for educators allocated to Form Six to adequately prepare their material before to instruction.

This E-History application, which was made especially for STPM History subject focus on topic sem 1. It’s included a test and exercises to make history classes more engaging and enjoyable. Four topics are covered in the history form 6 semester 1 syllabus: nationalism and the creation of the nation state; government and administration; progress and development; and society. The purpose of this programme is to develop an extensive and easily navigable learning platform focused on this topic. This engages kids, helps them become familiar with historical questions, and makes it easier for them to respond to similar inquiries down the road. It is advantageous for teachers as well because they can assign the question to their pupils as a homework assignment or extra assignment. It can also broaden

students' knowledge by helping them comprehend the subject and provide the appropriate response in addition to helping them respond to questions. In this application development, multimedia element also included to make sure the application are interactive and enjoyable while using. The figure 1 below shows the diagram for elements of multimedia.

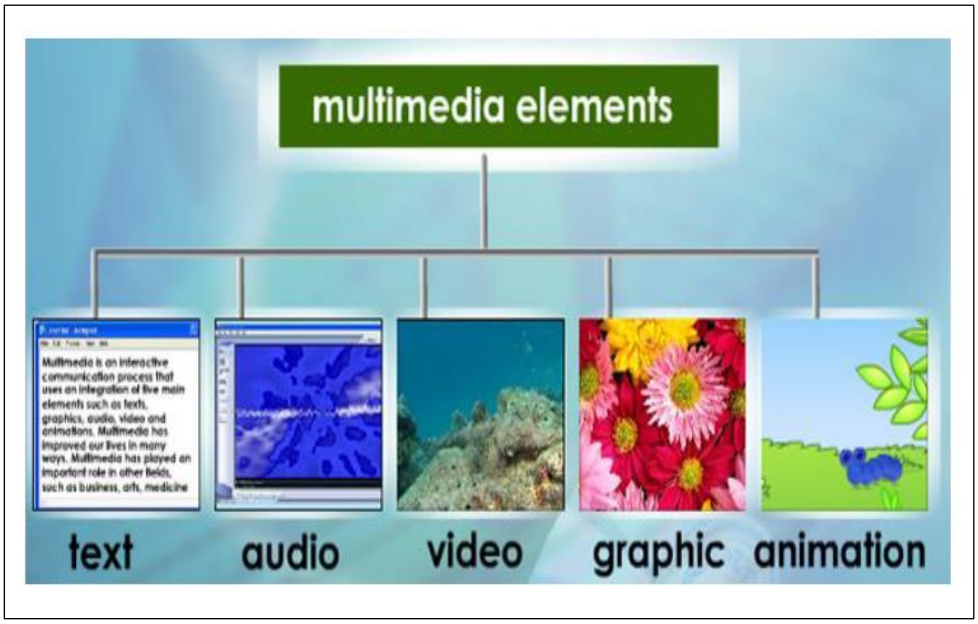

Figure 1: Diagram elements of Multimedia

Methodology

The development of e-history application for STPM student (Sem 1) is based on ADDIE model which contain Analyses, Design, Development, Implementation and Evaluation. This model was applied to define the progress needed to complete the project by modifying the process in the ADDIE model. These five steps showed dynamic, customizable training in the development of powerful training and performance support systems. Though it was developed in the 1970s, the ADDIE training paradigm is currently the most widely utilized model for instructional design due to its extraordinary efficacy and simplicity (Andrew Downes,2019). The abbreviation ADDIE stands for Analysis, Develop, Implement, and Evaluate, as illustrated in figure 2. There are five stages in the learning and growth process. By supporting the methodical identification of the learning need and guaranteeing that all learning activities meet the objectives, ADDIE offers an integrated approach to teaching.

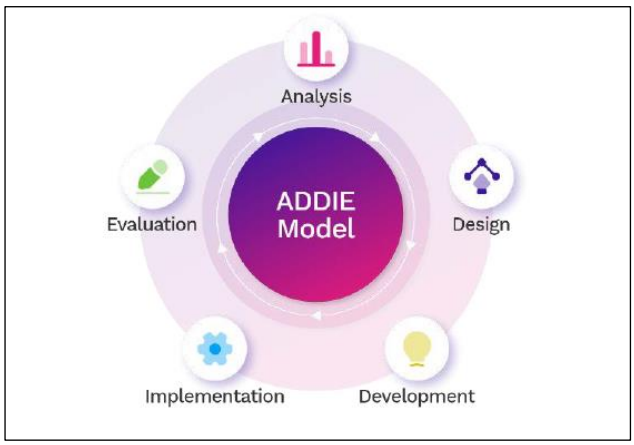

Figure 2: ADDIE Model

A Gantt chart was a tool for project management that could have been used for any kind of project, but it was especially useful for handling complicated activities. After translating project management tasks and schedules, a horizontal bar chart is produced that shows the starting and ending dates, roles, due dates, and % of daily effort. For this project, a Gantt chart was also used since it helped to make sure that tasks were finished on schedule. The data on the Gantt chart was connected with the ADDIE model. A Gantt chart used for project planning is shown in Figure 3.

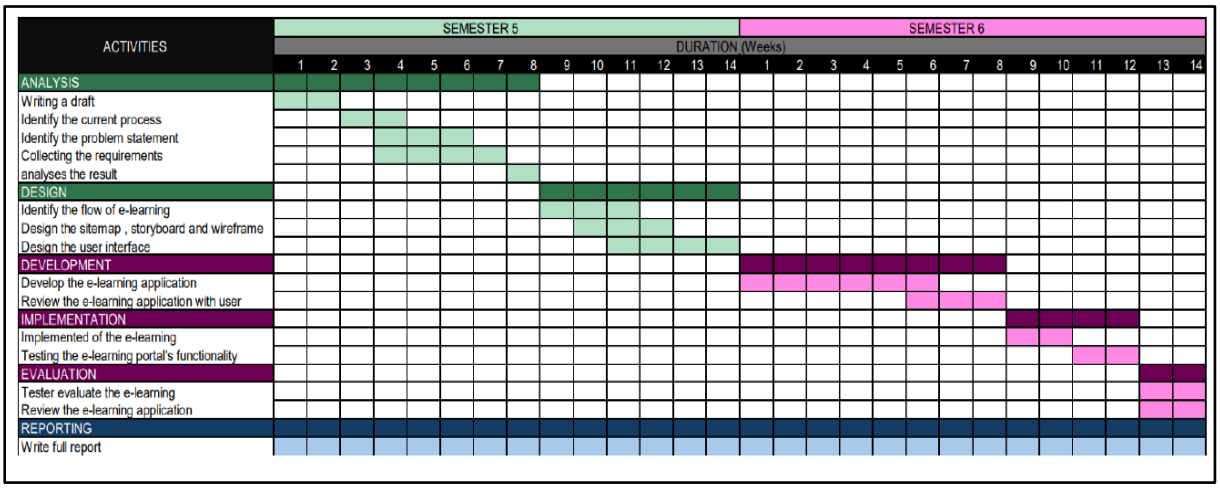

Figure 3: Gantt chart for E-History Development

Project Development

To accomplish the primary goal of the project, more preliminary study and necessary documentation were included. The project framework for this e-learning application development based on ADDIE Model is discussed in Table 1 below.

Table 1: Framework for E-History Applications

Phases	Activities
Analysis	Identify the current business and problem statement by conducting interview to form 6 student and history teacher.
Design	Design sitemap. Design storyboard. Design wireframe.
Development	Develop interactive education e-learning application consisting of multimedia elements.
Implementation	e-history application for STPM student (Sem 1) publishin play store. e-history application functionality is tested
Evaluation	Create a suitable questionnaire. Test the e-history application usability

Conclusions

E-History Application as an application developed to help STPM students in their study. This e-learning application utilizes the adapted ADDIE model as its approach, which consists of five phases: analysis, design, development, implementation, and evaluation. Beside this, it also include all of the multimedia elements to make sure the application keeps engage with interactive and interesting to help the student in their study.

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