

Analysing and visualising the X network: insights into Malaysian certificate of education assessment using NodeXL

Najihah Pazaer

*Faculty of Arts and Social Science, Universiti Tunku Abdul Rahman,
Kampar, Malaysia*

Darshnee Muniandy

Faculty of Education, Universiti Tunku Abdul Rahman, Kampar, Malaysia

Ling Khai Lee, Mohd Amir Izuddin Mohamad Ghazali and

Ayu Rita Mohamad

*Faculty of Arts and Social Science, Universiti Tunku Abdul Rahman,
Kampar, Malaysia*

Siti Ummaizah Meor Musa

Faculty of Education, Universiti Tunku Abdul Rahman, Kampar, Malaysia, and

Jeya Sarkunan Jayathilagaratnam

*Faculty of Arts and Social Science, Universiti Tunku Abdul Rahman,
Kampar, Malaysia*

Abstract

Purpose – This study explores how issues related to the Malaysian Certificate of Education (Sijil Pelajaran Malaysia, SPM) are discussed and disseminated on Platform X, with a specific focus on identifying key influencers, popular narratives and community dynamics within the digital discourse.

Design/methodology/approach – Social network analysis was conducted using NodeXL on 1,279 tweets containing the keyword “Sijil Pelajaran Malaysia”, posted between 2 March 2022 and 27 February 2025. The study identified influential users through betweenness centrality and visualised the network structure using the Clauset–Newman–Moore clustering algorithm.

Findings – The analysis identified 596 unique users, including the 10 most influential accounts, most used hashtags and the most frequently shared URLs. The top influential users demonstrated betweenness centrality score ranging from 1814.5 (first-ranked user) to 188 (tenth-ranked user). The network structure revealed distinct clusters, with educational institutions and ministry-affiliated accounts fostering supportive, community-based engagement, while public users expressed a divergent perspective on the SPM examination.

Research limitations/implications – The findings are based solely on data retrieved from Platform X and are limited to a specific keyword within a defined time frame, which may not capture all relevant conversations. Future studies could incorporate multi-platform analysis or longitudinal tracking to enrich understanding of digital discourse in education policy and reform.



© Najihah Pazaer, Darshnee Muniandy, Ling Khai Lee, Mohd Amir Izuddin Mohamad Ghazali, Ayu Rita Mohamad, Siti Ummaizah Meor Musa and Jeya Sarkunan Jayathilagaratnam. Published in *Journal of International Cooperation in Education*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at [Link to the terms of the CC BY 4.0 licence](https://creativecommons.org/licenses/by/4.0/).

This paper forms part of a special section “Examining the Dynamics of the School Environments in Africa and Asia Using Social Media Network Analysis”, guest edited by Drs Mohd Ali Samsudin, Chia Chun Tiew and Wee Ling Tan.

Disclosure statement: No potential conflict of interest was reported by the author(s).

Originality/value – This study demonstrates the robustness of SNA in examining the dynamics of educational discourse in digital spaces. It provides novel insights into the role of weak and strong ties in shaping public narratives, offering a digital lens into how SPMs are perceived and discussed in Malaysia.

Keywords Social network analysis, X, Sijil Pelajaran Malaysia, Malaysian Certificate of education, Influencers

Paper type Research article

1. Introduction

The Sijil Pelajaran Malaysia (SPM), or the Malaysian Certificate of Education, is a national examination that students undertake at the end of their secondary school journey. It plays a critical role in determining eligibility for higher education and employment prospects nationwide, and is administered by the Malaysian Examinations Syndicate under the Ministry of Education (Mohd Radzi, Rosaidi, Abdul Rahman, Mohamad Sazali, & Rastom, 2024). It is often considered a benchmark for academic achievement, opening doors to scholarships, tertiary programmes and career prospects (Mohamad *et al.*, 2024). Given its far-reaching implications, the SPM is fundamental to students' educational and professional pathways, placing it at the heart of Malaysia's education system (Mohd Radzi *et al.*, 2024; Othman *et al.*, 2023). In parallel with the evolution of digital communication, social media platforms such as Twitter (now X), Facebook, TikTok and Instagram have become integral spaces for the public to share opinions and engage in discourse on national matters (Kasmani, 2024), including education (Kwecko, De Toledo, Devincenzi, De Ortiz, & Da Botelho, 2020; Zhou, 2024). These platforms allow for the dissemination and amplification of diverse perspectives, often reflecting societal attitudes towards high-stakes assessments like the SPM. Public reactions to examination outcomes, policy changes, and student achievements are increasingly visible in these digital environments. A study by the UCSI University Poll Research Centre found that 39% of SPM school-leavers intended to seek employment, with 34% aspiring to become social media influencers or affiliates.

Across these platforms, the portrayal of the SPM has surfaced with multiple problems and criticisms. Of particular concern, social media users frequently raise concerns about academic stress, mental health issues and inequalities in access to educational resources, particularly in rural areas. In addition, inequalities in student performance, the strain and anxiety of high-stakes tests and the difficulties SPM leavers encounter when deciding whether to pursue further education or enter the workforce following secondary school are commonly highlighted. Interestingly, the COVID-19 pandemic has disrupted traditional teaching and learning methods (Van de Werfhorst, Kessenich, & Geven, 2022), exposed the unequal access to digital resources among students (Rajput, Noonari, Bukhari, Dehraj, & Rajput, 2020; Valentia, 2023) and raised questions about exam preparedness and fairness (Li, 2024). Furthermore, prolonged school closures during the movement control order (MCO) significantly increased SPM absenteeism. In 2023, approximately 10,000 registered candidates did not sit for the examination, a trend linked to pandemic-induced disruptions. Besides that, Ayu Lestari *et al.* (2024) suggested that digital media, such as viral posts and memes posted with humorous and critical tones, reflect a mixture of anxiety, critique and satire. These expressions underline the symbolic and emotional weight of the examination and its perceived role in shaping young Malaysians' futures. Despite the proliferation of these conversations online, there is a notable gap in empirical research on how the SPM is portrayed and perceived on social media. While several studies have examined the general influence of digital platforms on youth political awareness and social behaviour (Njonge, 2023; Noorman *et al.*, 2024), and others have explored the impact of media literacy in the post-pandemic era (Onyancha, 2023; Rosli *et al.*, 2025; Sarikaya, 2022), much of the current literature relies on surveys or qualitative interviews, which may not capture the full complexity and spontaneity of social media interactions.

With regards to this, Johnson and Chew (2021) argue that social network analysis (SNA) offers a promising methodological approach to address this gap. By mapping interaction patterns, identifying influential accounts and analysing community clusters within conversations, SNA can provide deeper insights into how discourse about the SPM evolves

and spreads across digital networks. Unlike traditional content analysis, SNA enables researchers to uncover underlying structures of influence and sentiment formation, offering a broader understanding of how public perceptions are shaped in the age of networked communication. This study aims to bridge the current gap by employing SNA to investigate Malaysian netizens' perceptions towards Sijil Pelajaran Malaysia, the high-stakes examination. The research seeks to uncover dominant themes, emotional tones, key influencers and engagement patterns surrounding the SPM.

2. Literature review

2.1 *The role of X in information dissemination*

The simplicity of X makes it a widely utilised platform for reporting on current events, enabling rapid dissemination of information. As noted by [Grandjean \(2016\)](#), its ease of use contributes to its popularity among users, particularly for real-time updates and event coverage. During the COVID-19 pandemic, [Wang, Liu, and Zhang \(2021\)](#) demonstrated how retweeting dynamics can effectively spread crisis-related information, highlighting the platform's capacity to reach large audiences quickly. Research increasingly shows that X is not just a platform for sharing education policy updates but a space where policy meanings are actively shaped. [Supovitz and Reinkordt \(2017\)](#) showed how users on X reframed the US Common Core through metaphors that cast the reform as a threat to autonomy. Extending this, [Baroutsis and Lingard \(2025\)](#) argue that X amplifies such framing by intensifying the "mediatisation" of schooling. Together, these studies illustrate that X plays a central role in shaping how educational reforms are interpreted and contested in public discourse. These same features can benefit educational contexts, including discussions and updates about SPM, thereby emphasising X's role in shaping public discourse around important academic matters. However, the credibility of information shared on X remains a pressing concern. While the platform's real-time capabilities facilitate fast-paced news sharing, that same speed can accelerate misinformation and rumours, as seen when unverified claims circulate and cause confusion for students and parents. Studies such as [Roberts and Hu \(2018\)](#), which highlight the use of social media for research dissemination and professional networking, also caution that users must employ critical thinking and verify sources to mitigate misinformation risks.

In education, X helps researchers track discussions, identify influencers and uncover narratives about schools or teachers in Malaysia. Tools like NodeXL visualise network interactions, enabling deeper insights into communication patterns. [Norfarah, Siti-Nabiha, and Samsudin \(2022\)](#) demonstrated this by analysing influencer dynamics in SME-related conversations, indicating the platform's potential for studying educational discourse. Beyond tracking, research shows that X also serves as a platform where education-related policies are actively framed and contested. [Jungherr \(2015\)](#) demonstrated that institutional actors strategically use X not only to disseminate information but also to shape how issues are publicly understood, a strategy echoed in the Gulf, where [Aldekhyyel et al. \(2022\)](#) found ministries framing health and education messages to reinforce policy credibility and sustain trust in state institutions. In Malaysia, similar strategies are emerging, with [Alenzi and Miskon \(2024\)](#) observing that government agencies increasingly adopt youth-friendly digital platforms to frame policies in accessible and relatable terms, thereby broadening engagement and shaping public narratives around education. Another recent Malaysian and Southeast Asian research reinforces X's importance for understanding policy-related discourse, while also showing that similar dynamics extend across other platforms. [Atan and Norwahi \(2025\)](#) demonstrate how multilingual, affective tweets on X reveal students' responses to institutional policies in Malaysian ODL contexts. Beyond X, studies using SNA on Facebook ([Bukhari et al., 2020](#); [Idris & Ghani, 2012](#)) show how central actors and interaction clusters shape how students interpret regulations and academic expectations. This pattern continues on YouTube, where [Samsudin, Halim, Syukri, Tiew, and Putri \(2025\)](#) map influential channels circulating themes such as curriculum and equity across borders. Together, these studies show that although X is a

key arena for policy discourse, Facebook and YouTube display parallel flows, offering methodological precedents for analysing how SPM-related narratives travel within Malaysian digital spaces. By applying similar methods, researchers can better understand stakeholder engagement and develop more effective, evidence-based strategies within the education sector.

2.2 Public perception of SPM

The SPM has long been considered a crucial milestone in the Malaysian education system, where academic performance significantly influences students' future opportunities. Traditional perceptions place a strong emphasis on the examination's ability to measure academic excellence, often defining students' success in terms of exam results. The SPM has thus become synonymous with educational achievement in Malaysia, where students' futures are often perceived as reliant on their performance in this high-stakes examination (Jing, 2021).

Further research by Ong, Lei, and Lee (2015) examined the role of emotional and motivational factors in shaping academic performance among Malaysian students. Their study found that students' self-efficacy and motivation were key contributors to their performance in assessments like the SPM. These affective characteristics significantly impact how students approach exams and contribute to public perceptions of the examination system's fairness and effectiveness. The authors suggest that the influence of emotional and cultural factors should be considered when evaluating the public perception of the SPM, as these factors affect not only academic outcomes but also students' overall experience with the educational system.

In light of the growing concerns about mental health and the narrow focus on examination results, there is increasing advocacy for educational reforms. Critics argue for a more holistic assessment approach that reduces reliance on high-stakes exams like the SPM. Removing high-stakes examinations can also alleviate unnecessary stress and pressure among students, contributing to a more supportive and positive learning atmosphere (Marzaini *et al.*, 2024). The same study also posited that the introduction of school-based assessments offers a more well-rounded evaluation of student abilities (Marzaini *et al.*, 2024). These reforms aim to alleviate the pressures associated with traditional exams while still maintaining standards of academic excellence (Teach For Malaysia, 2025). However, challenges such as the increased workload on teachers and the need for proper training in alternative assessment methods remain important considerations.

2.3 The misuse of social media in fuelling negative sentiments

The Malaysian education system has long been exam-oriented, emphasising memorisation over critical thinking. This exam-heavy model has come under increasing scrutiny for failing to reflect real-world learning. Jasmi (2023) argues that such an approach creates undue pressure on students, with some even equating exam failure with personal failure. According to Ali (2024), experts argue that this approach limits students' problem-solving skills and fails to prepare them for the workforce. In response, education experts like Dr Anuar Ahmad from Universiti Kebangsaan Malaysia advocate for a transition to a holistic assessment system incorporating project-based evaluations and continuous assessments. This growing call for reform is echoed by Jalal Nori (2019), who critiques the dominance of exam culture in fostering only surface-level understanding. He calls for a paradigm shift in teaching approaches that prioritise higher-order thinking skills over rote memorisation. The current model also contributes to student stress and anxiety, as academic performance is heavily prioritised. While some stakeholders support exams as a measure of rigor, others believe skill-based learning is more effective. The Education Ministry faces challenges in balancing these perspectives while implementing meaningful reforms. The ongoing debate highlights the need for a balanced approach that integrates both formative and summative assessments to create a more effective learning environment.

Social media platforms, particularly X, play a major role in shaping public narratives around SPM. While the Ministry of Education uses official platforms like @KemPendidikan to share verified updates, emotionally charged and opinionated user-generated content often

gains far more traction. [Balakrishnan \(2022\)](#) found that a significant portion of Malaysian young adults shared misinformation knowingly or unknowingly during the COVID-19 pandemic, emphasising that Malaysian youth are heavy social media users, often relying on these platforms for news and academic updates, yet lacking skills to evaluate credibility.

The viral backlash on X surrounding the Education Minister's suggestion to abolish exams like the SPM illustrates how online discourse can distort education reform efforts. The discussion surrounding the abolition of school exams in Malaysia has garnered attention due to the perceived negative impact that exams have on students' mental health. Critics argue that exams induce stress, breed competitiveness, and hinder the overall development of students, advocating for a more holistic, inquiry-based education model. This sentiment is echoed by many on social media platforms like X, where negative comments highlight the pressure associated with traditional exams. However, some maintain that exams are crucial for assessing students' readiness for real-world challenges and stress that the focus should be on improving stress management rather than abolishing exams altogether ([Focus Malaysia, 2025](#)). The debate reveals the complex balance between academic evaluation and student well-being, and it accentuates the need for further research into alternative methods of assessment that do not compromise educational quality. These emotionally driven narratives illustrate how algorithms amplify outrage, distorting public understanding and derailing meaningful debate.

Comparative research indicates that these dynamics are not confined to [Jalli's \(2025\)](#) study of TikTok activism in Indonesia, Malaysia and the Philippines illustrates how the platform's short-form, affect-driven content architecture enables users to construct emotionally charged interpretations of education, governance and social justice issues. Similar mechanisms have been observed in other domains. [O'Sullivan, Nason, Manecksha, and O'Kelly \(2022\)](#) show that TikTok's engagement-oriented algorithms facilitate the circulation of inaccurate health information, while [Kirkpatrick and Lawrie \(2024\)](#) demonstrate that many young people rely on TikTok as a primary information source despite limited evaluative skills. [Yu's \(2025\)](#) review further finds that misinformation intensifies during crisis moments due to the platform's recommendation dynamics. Collectively, these studies explain how discussions of SPM and assessment reforms can be rapidly reframed into moral panics or political critique, often decoupled from policy texts or empirical evidence.

2.4 Structuralist and network theories: weak ties and structural holes

The Structuralist Theory centres on how patterns of interaction within a social network can shape the emergence of topics and activities in a research discipline. By examining the social interplay among individuals (or "actors"), structuralist perspectives illuminate how these collective behaviours both create and recreate the conditions for ongoing activities ([Giddens, 1984](#); [Whittington, 2010](#)). Two fundamental elements that illustrate structuralism's relevance are interaction and structure. Interaction focuses on the dynamics of networks in space and time, showing how individuals work together or apart to solve problems and achieve desired outcomes. Structure, in turn, refers to the enduring relationships and norms that shape and are shaped by these interactions.

Building on these ideas, Structural Hole Theory, developed by [Burt \(1992\)](#), examines gaps in relationships within networks, referred to as structural holes. These gaps create opportunities for brokers, or Structural Hole Spanners (SH Spanners), to connect disconnected groups, facilitating the flow of information and resources. This not only enhances communication and collaboration but also positions brokers in strategic roles that yield competitive advantages. The role of weak ties in bridging these structural holes has been widely recognised in network theory, most notably through [Granovetter's \(1973\)](#) Weak Tie Theory, which demonstrates that infrequent, low-intensity connections often serve as critical channels for introducing novel information into a network.

When applied together, Weak Tie Theory and Structural Hole Theory explain how individuals or nodes occupying bridging positions can connect otherwise isolated clusters,

enabling the exchange of diverse perspectives and resources. These bridging roles are particularly influential in dynamic and loosely connected networks, where information diffusion relies less on dense, repetitive links and more on sporadic but strategically positioned ones. Metrics such as effective size and constraint, as proposed by [Lin et al. \(2021\)](#), provide practical tools for evaluating these connections. Effective size measures the number of nonredundant ties a node maintains, while constraint evaluates the degree to which a node's connections depend on a single actor. These metrics are widely used in SNA to identify influential nodes and assess their capacity to bridge structural holes, further enriching the analysis of network structures.

In the context of education, the practical application of these principles becomes particularly evident. For instance, [Carolan \(2013\)](#) applies Granovetter's concepts of weak ties alongside Burt's structural hole theory to educational networks, highlighting how weak ties act as critical bridges for connecting teachers, policymakers and other stakeholders. These connections enable the rapid dissemination of resources and best practices, which SNA helps visualise and analyse by mapping the flow of information within these networks. Expanding on these principles, [Ahuja \(2000\)](#) underlines the role of brokers in driving innovation within collaborative networks, showing that bridging structural holes allows for the convergence of diverse ideas, leading to novel strategies and solutions.

Further reinforcing these perspectives, SH Spanners play a transformative role on digital platforms like X (formerly Twitter), where they bridge disconnected groups, amplify the flow of information, and foster collaboration. In the present study, weak ties observed within the Malaysian Certificate of Education discourse on X often represented occasional interactions between users who did not share strong prior relationships, yet these ties enabled the spread of novel perspectives and reframed ongoing conversations. These connections, when coinciding with structural hole positions, link geographically and socially distant actors who would otherwise remain disconnected, creating opportunities for rapid, cross-cluster sharing of ideas. These functions are particularly relevant in educational discourse, where bridging gaps promotes communication and innovation ([Lin et al., 2021](#)). By mapping these bridging positions, the analysis illustrates how dispersed conversations can nonetheless form cohesive knowledge flows. This reflects [Granovetter's \(1973\)](#) assertion that weak ties serve as critical conduits for novel information, while also aligning with [Burt's \(1992\)](#) Structural Hole Theory, in which actors positioned between otherwise disconnected groups can channel and reshape the flow of information. Together, these dynamics highlight the role of certain users as influential connectors in online educational discourse, capable of introducing content that shifts narratives and connects fragmented discussions.

3. Method

This study employed a systematic approach, using SNA to investigate the public conversation surrounding the Malaysian Certificate of Education (Sijil Pelajaran Malaysia or SPM) on Platform X (formerly Twitter). SNA provides a robust analytic lens to explore interaction patterns, influential nodes in a network, and overall communication networks within a digital ecosystem ([Borgatti, Everett, & Johnson, 2018](#)). [Ahmed, Meier, and Smith \(2022\)](#) pointed out that the results of Twitter searches are significantly influenced by the quality of the search terms. Before extracting data, it is essential to establish search queries that will determine how the data is filtered ([Goritz, Kolleck, & Jörgens, 2019](#)). This section presents data collection, data cleaning and network analysis with NodeXL Pro software.

3.1 Social network analysis

SNA is a data analysis technique that applies network and graph theory to examine complex network structures on social media ([Borgatti, Mehra, Brass, & Labianca, 2009](#)). It focuses on exploring the patterns of relationships and interactions between social entities like individuals, groups, organisations or online platforms. The network included vertices (nodes) representing individual users and edges (ties) capturing the interactions between them ([Borgatti et al.,](#)

JICE
28,1

36

2009). Graph generation and network visualisation were performed using NodeXL Pro software. For the clustering of vertices, the Clauset-Newman-Moore algorithm was used to identify different communities in the network. Various metrics, including betweenness centrality, in-degree centrality, and out-degree centrality, were employed to identify influential users and their positions in the discourse. The vertices, edges, reciprocated pairs and modularity were computed (which is an indicator of the density and cohesiveness of the network structure) to create graph-level metrics.

3.2 X sampling for Sijil Pelajaran Malaysia (Malaysian Certificate of education)

To examine the public perception of Sijil Pelajaran Malaysia, also known as Malaysian Certificate of Education (SPM) in Malaysia on social media, this study adopts a systematic methodology. A list of SPM-related accounts was gathered using Platform X (formerly known as Twitter) search queries with the relevant phrase, “Sijil Pelajaran Malaysia”.

In total, this study extracted 596 X users whose recent tweets contained the relevant keywords, or who were replied to or mentioned in the tweets. The data was gathered from X for the period from 2 March 2022 to 27 February 2025. Moreover, inactive accounts, including those that had not posted in the past six months, were excluded. Likewise, accounts with fewer than 100 followers were removed to ensure a focus on tweets with wider reach and greater impact. Table 1 presents the top 10 accounts that met these criteria for further analysis.

4. Findings

4.1 Social network analysis for Sijil Pelajaran Malaysia content

As displayed in Figure 1, the findings present the network graph that depicts interactions and discussions related to SPM topics on X. Information dissemination was done through individuals, organisations, and governance accounts. The clusters represent distinct groups engaged in interconnected discussions, highlighting Sijil Pelajaran Malaysia-related topics in the Malaysian context. The size of the nodes and the density of their connections reflect the influence and activity levels of these accounts in contributing to the depth of the conversations.

The analysis identifies the graph cluster as a community cluster, as shown in Figure 1, which contained multiple medium-sized groups rather than a dispersed crowd of unconnected X users. Additionally, community clusters contain larger and more interconnected groups, implying that a significant number of contributors discuss topics about SPM within their own group. These can illustrate diverse angles on SPM according to its relevance to different groups of audience, revealing diverse opinions on SPM. Hence, the findings further indicate that discussions about SPM are widespread on X, involving numerous interconnected parties.

Table 1. Overall graph metrics

Vertices	597
Unique Edge	432
Edges With Duplicates	1,136
Total Edges	1,568
Self-Loops	1,399
Reciprocated Vertex Pair Ratio	0.014285714
Reciprocated Edge Ratio	0.028169014
Connected Components	462
Single-Vertex Connected Components	418
Maximum Vertices in a Connected Component	50
Maximum Edges in a Connected Component	446
Maximum Geodesic Distance (Diameter)	9
Average Geodesic Distance	2.890092
Graph Density	0.000399087
Modularity	0.2158

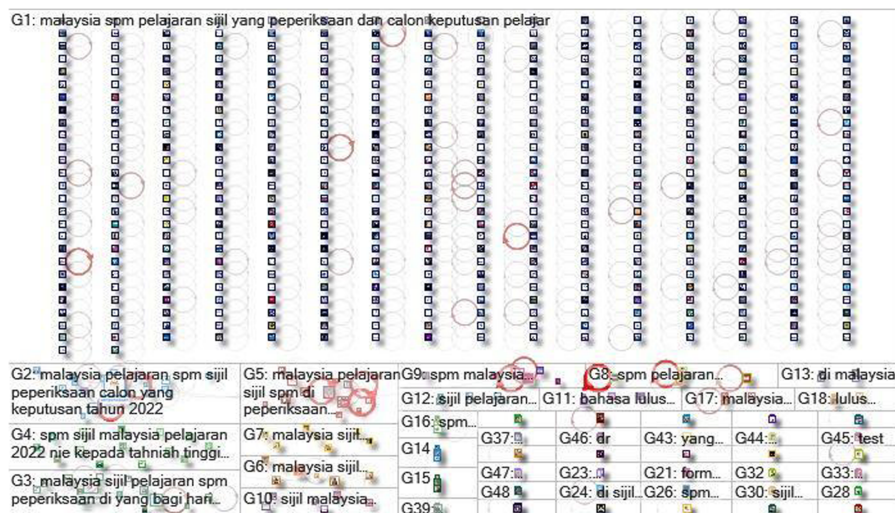


Figure 1. NodeXL graph for Sijil Pelajaran Malaysia (Malaysian Certificate of Education) related account on X

The NodeXL-generated network graph identified a total of 49 distinct groups, with 10 most prominent groups. Group 1 emerged as the largest group. Visual representations of social media connections displayed various network structures, explaining the group dynamics revolving SPM. These structures revealed how individuals, government agencies and news organisations connected and spread the related information within the network.

4.2 Overall graph metrics

The overall graph metrics were presented in Table 1. The analysis indicated that there were 597 X users in the entire network. The analysis identified the top 10 key players with the highest betweenness centrality scores. The findings highlighted various perspectives on SPM in Malaysia, with discussions focusing on varied aspects of SPM as the central theme.

4.3 User analysis

Table 2 ranks influential users according to their betweenness centrality and includes a description of their accounts. The ranking is based on betweenness centrality scores, while the account description specifies the type of account. The betweenness centrality column presents each user's raw score, whereas the follower column records the number of followers linked to each account. Additionally, the group cluster column classifies users into specific groups, as illustrated in Figure 1. The follower count represents the number of followers each user had during the designated period.

Based on the findings, there are four media and news companies listed as the top 10 influential users on X that discuss news about SPM. Firstly, the X account that owns the highest follower count (1.2 million) is a media and news company that publishes trendy and updated national and international news, followed by media and news company 3 (82 thousand followers), and the deputy prime minister of Malaysia. Next, the account that own the most tweets (510 thousand), is an official account of media and news company 2 in Malaysia, followed by media and news company 3, media and news radio and media and news company 1, all reaching more than 200 thousand tweets on X. This highlights the significant role of news and media companies in Malaysia in sharing information of SPM nationwide on X.

Table 2. Top 10 influential users with the highest betweenness centrality score

Rank	Description	Followers	Betweenness centrality	In-degree centrality	Out-degree centrality	Group cluster	Tweet
1	The Ministry of Education Malaysia	180,222	1814.5	19	1	2	29,076
2	Media and news company 1	210,261	996	2	6	5	205,801
3	Minister of Education	49,296	534	5	1	5	11,654
4	Department of Information Services Malaysia	249,910	508.5	8	2	3	67,243
5	Media and news – radio	117,987	440	1	3	9	324,553
6	Deputy Prime Minister Malaysia	561,501	360	3	1	9	16,336
7	Media and news company 2	1,237,488	282	5	2	3	510,905
8	Media and news company 3	813,976	282	4	2	5	423,763
9	Department of Information Services Malaysia	15,962	245	0	5	3	77,872
10	Journalist	1,021	188	0	2	2	661

4.3.1 #1 *The Ministry of Education Malaysia*. The Ministry of Education Malaysia plays a central role in community and education discourse, as evidenced by its highest number of mentions. The account frequently receives mentions in tweets highlighting the latest announcements about SPM. For instance, a tweet about the SPM result release date gathered 71.1 thousand views, whereas another tweet regarding exam paper leak garnered 1,950 impressions (see Table 3).

These interactions primarily revolve around local events and ministry initiatives to ensure a smooth conduct of the annual public Form Five examination. Its influence is reinforced by its consistent presence in conversations on topics such as examination matters, educational projects, students’ learning and enrichment programmes. Tweets related to the announcement of the SPM result release, students’ enrolment in higher education after SPM, and invalid accusations gain the highest engagement, suggesting that the audience is particularly responsive to issues related to SPM.

4.3.2 #2 *minister of education*. Minister of Education received a high number of mentions from several influential users. One notable post about video by a politician generated the highest number of impressions at 92.4 thousand views, along with 89 reports and 191 favourites. Another important mention of prominent personalities achieved 1,071 impressions, 21 retweets and 123 favourites. Other mentions, often in religious contexts, also led to significant engagement, with one such mention resulting in 250 impressions, 5 retweets and 8 favourites (see Table 4).

Among the responses, the pattern of engagement was slightly different. For example, one response that included a prayer generated 57 views and 2 favourites, while another response had 57 views, 5 favourites and 2 replies. The overall data suggests that mentions generate more visibility compared to replies. This suggests *Madrasah-2* has a greater impact on the public when attached to broader conversations about community events and religious discussions. The most impactful posts tend to include content on religious or education-related topics, such as prayers, health information and interactions with religious figures.

Table 3. Sample tweets from #1 most influential user – The Ministry of Education Malaysia

Date	Tweet	Repost count	Like count	Reply count	Views
May 10, 2024	Pengumuman keputusan Sijil Pelajaran Malaysia (SPM) akan dilaksanakan pada 27 Mei 2024. Calon digalakkan untuk menyemak keputusan masing-masing secara dalam talian di pautan http://myresultspm.moe.gov.my mulai 27 Mei 2024, pukul 10.00 pagi sehingga 2 Jun 2024, pukul 6.00 petang Translated: The announcement of the Malaysian Certificate of Education (SPM) results will be made on 27 May 2024. Candidates are encouraged to check their results online at the link http://myresultspm.moe.gov.my from 27 May 2024, 10.00 am until 2 June 2024, 6.00 pm #7TerasKPM #MalaysiaMADANI #PendidikanManusiawi	337	443	19	71.1K
July 14, 2024	HENTIKAN FITNAH! Inisiatif Kementerian Pendidikan Malaysia (KPM) memastikan semua pelajar cemerlang 10A Sijil Pelajaran Malaysia (SPM) mendapat tempat untuk melanjutkan pengajian adalah suatu reformasi pendidikan yang memastikan tiada siapa yang tercicir #7TerasKPM #MalaysiaMADANI#PendidikanManusiawi Translated: STOP ACCUSATION! The initiative of the Ministry of Education Malaysia (KPM) to ensure that all excellent 10A students in the Malaysian Certificate of Education (SPM) get a place to continue their studies is an educational reform that ensures that no one is left behind	41	94	10	8,697
Jan 9, 2025	Dakwaan kertas soalan peperiksaan Sejarah Sijil Pelajaran Malaysia (SPM) Tahun 2024 bocor adalah TIDAK BENAR. #7TerasKPM #MalaysiaMADANI#PendidikanManusiawi #TaatSetia Translated: The claim that the 2024 Malaysian Certificate of Education (SPM) History examination question paper was leaked is NOT TRUE.	17	18	1	1950

4.4 Top 10 hashtags

The 10 most used hashtags, with counts ranging from 25 to 90, are presented in Table 5. The analysis identified several similar patterns in the conversation topics. First, the top-ranked hashtag is “#malaysiamadani” ($n = 90$). It shares a similar meaning with the 10th most used hashtag, “#keluargamalaysia” ($n = 10$). Both hashtags imply the importance of SPM in determining secondary students’ path to higher education.

Hashtags “#spm” ($n = 85$), “#spm2022” ($n = 62$), “#spm2021” ($n = 44$) and “#spm2023” ($n = 41$) mainly focus on SPM, citing similar conversation topics among the communities in most of the largest groups within the network. Three hashtags, “#nstnation” ($n = 50$), “#rtm” ($n = 45$), and “#beritartm” ($n = 44$), are associated with the local media and news company in sharing information about SPM on X. Lastly, the ninth hashtag, “#jabatanpenerangan” ($n = 34$) appeared frequently in Group 1 and 3, indicating the significant role of Department of Information Services in disseminating information about SPM to the public.

The findings revealed the key role of national exams in the Malaysian school context in promoting students’ key stages to excel in higher education and learning. The results reveal that several top hashtags are associated with education, Malaysian Certificate of Education, and Malaysian news publishers in Malaysia. It implies that the country is striving to bridge the gap in education across different continents.

Table 4. Sample tweets from #2 most influential user – Minister of Education

Date	Tweet	Repost count	Like count	Reply count	Views
Jun 11, 2023	@KemPendidikan teliti punca 14,858 calon tak hadir duduki SPM #KPM #ketidakhadiran #SPM #FadhlinaSidek #edisi9 #beritaterkini #malaysia	0	0	0	29
Jun 11, 2023	Translated: @KemPendidikan investigate the reasons why 14,858 candidates did not sit for the SPM exam The Education Ministry (MOE) is studying the factors that contributed to the non-attendance of Sijil Pelajaran Malaysia (SPM) students on their examination day. #FadhlinaSidek #MOE #Candidates #Examination #SPM	0	0	0	57
Dec 2, 2024	Menteri Pendidikan jangan buat pekak badak! Jangan zalimi pelajar SPM mangsa banjir di Kelantan, Terengganu, Kedah! Tangguh dan buat sesi kedua bagi mereka! #banjir #banjir2024 #banjirKelantan #banjirTerengganu #banjirKedah #spm #spm2024 #wanfayhsal #fadhlinasidek Translated: Minister of Education, stop turning a deaf ear! Don't oppress SPM students who were victims of floods in Kelantan, Terengganu, Kedah! Postpone the exam and hold a second session for them!	89	191	209	92.4K
Dec 2, 2024	Kementerian Pendidikan Malaysia (KPM) sedang mempertimbangkan cadangan untuk mengadakan peperiksaan Sijil Pelajaran Malaysia (SPM) di luar musim tengkujuh bagi mengelakkan gangguan akibat banjir. #kpm #banjir #spm #FadhlinaSidek #mediatelus Translated: The Ministry of Education Malaysia (MOE) is considering the proposal of holding the Sijil Pelajaran Malaysia (SPM) examination outside the monsoon season to avoid disruptions due to floods	0	0	0	27
Dec 5, 2024	Fadhlina berkata kehadiran keseluruhan adalah 99 peratus setakat Selasa, menunjukkan kelancaran Ops Payung. #opspayung #spm #sijilpelajaranmalaysia #fadhlinasidek #sesikedua #sekolah #banjir #pantaitimur #monsuntimurlaut #CapCut Translated: Fadhlina said the overall attendance was 99% as of Tuesday, indicating the smooth running of Ops Payung	0	0	0	38

Table 5. Top 10 hashtags in the entire graph

Rank	Top hashtags in tweet in entire graph	Entire graph count
1	malaysiamadani	90
2	spm	85
3	spm2022	62
4	nstnation	50
5	rtm	45
6	spm2021	44
7	beritartm	44
8	spm2023	41
9	jabatanpenerangan	34
10	keluargamalaysia	25

4.5 Top 10 URLs

This section explains the top 10 most shared URLs among X users within the entire graph (see Table 6). The second URL is an article titled “Over 9k straight As in 2021 SPM batch for first KSSM cohort [NSTTV]”, published on June 16, 2022, by New Straits Times Press. The report stated that 9,696 candidates of the 2021 SPM examination achieved straight As in all subjects, reflecting a slight rise compared to 2020, when 9,411 candidates attained the same results. The third URL refers to the main page of TVSarawak, which broadcasts local and worldwide articles and videos of various genres. The fifth and sixth URLs refer to articles published by Harakahdaily. The fifth URL titled “SPM 2023: Terengganu kekal rekod cemerlang” reported that 464 students out of 16,783 candidates from Terengganu scored all As in SPM 2023. The sixth URL is an article “Isu tarikh keputusan SPM 2023: Jangan abai kebajikan guru”, highlighting the issue of the result release day of SPM 2023.

According to the article, a leader from the religious party mentioned the irrelevance of the result release day as it fell in the first week of school holidays. The seventh URL is a news article titled “SPM written exam commences smoothly nationwide”, on January 30, 2024, by Sun Media. It reported that no issues prevented students from attending their examination centres, despite ongoing floods in certain areas. The SPM 2023 examinations proceeded as scheduled nationwide, with contingency plans effectively addressing potential challenges posed by natural disasters.

The eighth URL featured an online article titled “Banjir: Calon SPM terjejas diminta hubungi JPN” by Harian Metro, New Straits Times Press, explaining that Op Payung was initiated to ensure a smooth process of taking SPM for candidates who were affected by the flood. The deputy minister of education urged affected candidates to reach out to the state education department. Under the same publisher, the ninth URL refers to an online article titled “Pesakit barah limfoma tahap empat cemerlang SPM”, by The student, who was diagnosed with stage-4 lymphoma, persevered to strive for flying colours in SPM. Lastly, the tenth URL features an online examination portal by the Ministry of Education, which manages exam-related matters.

Table 6. Top 10 URLs in the entire graph

Rank	URL	Description	Count
1	http://lp.moe.gov.my	Malaysian examination council	5
2	https://www.nst.com.my/news/nation/2022/06/805407/over-9k-straight-2021-spm-batch-first-kssm-cohort	Local news publisher 1	4
3	http://tvsarawak.my	Local news publisher 2	4
4	https://dbook.penerangan.gov.my/dbook/?product=risalah-pendidikan-tertiari-jamin-tenaga-mahir-negara	Brochure by government agency	3
5	https://harakahdaily.net/index.php/2024/05/27/spm-2023-terengganu-kekal-rekod-cemerlang/	Local news publisher 3	2
6	https://harakahdaily.net/index.php/2024/05/13/isu-tarikh-keputusan-spm-2023-jangan-abai-kebajikan-guru/	Local news publisher 3	2
7	https://thesun.my/local_news/spm-written-exam-commences-smoothly-nationwide-EH12042204	Local news publisher 4	2
8	https://www.hmetro.com.my/mutakhir/2025/01/1172014/banjir-calon-spm-terjejas-diminta-hubungi-jpn	Local news publisher 5	2
9	https://www.hmetro.com.my/mutakhir/2023/06/975454/pesakit-barah-limfoma-tahap-empat-cemerlang-spm	Africa’s Storytelling Platform	2
10	http://elp.moe.gov.my	Government examination portal	2

5. Discussion

The study investigated social media discourse revolving around the SPM examination through SNA. Findings revealed the key actors, discourse patterns, and influence of digital platforms on the public's view of SPM examination.

Key actors on the digital platform included government agencies, media organisations, political figures and student and parent groups who comprised the key influencers in discussions about SPM. The Ministry of Education and affiliated officials played a pivotal role in the dissemination of information. This is reflected in the notable rise in the use of SNA by governments to engage with citizens (Alenzi & Miskon, 2024). This trend emerged in response to findings from Lasi and Basiran (2021), which indicated that information shared by government agencies was not significantly influencing the public. It was evident that the government agencies' SPM-related announcements, such as examination schedules, policies and results made up the highly shared and most engaged posts. Tetteh and Kankam (2024) also recommended that the government, particularly local state governments with the highest population of teenagers, like Selangor, utilise youth-friendly platforms such as X, Instagram, and TikTok to disseminate information more effectively and widely. Media organisations were another key actor in the discourse. As highlighted in the study by Rosmani, Mutalib, and Sarif (2020), the advancement of media technology has significantly facilitated the dissemination of information to users. This supports Roberts and Hu (2018) findings, which emphasise the benefits of using social media for research dissemination and professional networking. Major news portals significantly amplified the SPM-related discussions acting as brokers in Burt's (1992) terms by spanning structural holes between policymakers, educators and the public. Their role not only diffused official narratives but also shaped which perspectives gained traction, reflecting how structural positioning influences discourse outcomes. Narratives surrounding examination reforms, student performance and policy changes have been significantly influenced throughout this process. The digital platform has notably featured the presence of the Minister of Education, particularly in discussions related to the SPM examination. In Malaysia, mobile phones are considered the most effective means of disseminating information, as they are owned by nearly half the population and provide quick access to the Internet, which is regarded as a popular medium among Malaysian adolescents (Rosmani *et al.*, 2020). This, in turn, ensures that SPM students can easily access relevant information with just a simple swipe of the finger. Some of the activities engaged by the minister were concern address, criticism responding and government initiative promotions. Besides strengthening the presence of the government in the discourse, statements issued by the minister also created high levels of engagement from the public. This reflected the public's interest in education policies. Student and parent groups comprised fewer dominant clusters. Their discussions encompass personal experiences, concerns about exam difficulty and academic and career aspirations, clearly reflecting the specific interests of public. Teenagers, particularly school students, frequently use social media to share various types of content, including personal information (Wok, Idid, Misman, & Rahim, 2012). These peripheral interactions mirror Granovetter's (1973) concept of weak ties, as even infrequent contributions introduced distinct perspectives on stress and mental health into the discourse. This demonstrates how seemingly minor actors, through weak connections, can nonetheless influence broader shifts in educational narratives.

The network analysis enriched the understanding of clusters and discourse patterns. The three main distinct community segments, namely policy and reform cluster, student experience cluster and media and public perception clusters, were found to be interconnected with each other and distinctive aspects of SPM were reflected. Government decisions on exam structures and curriculum modifications were at the centre of discussions of policy and reform cluster, whereas student experience in exam preparation, stress and motivational content were discussed and made up the content affiliated with the student experience cluster. On the other hand, the Media and public perception cluster's conversations revolved around news reports, analysis and public reactions to SPM results and policy

changes. The researchers posited that the distinctive community segments represented the main agent (government), the theme (public's perception of the exam) and the voice of the public through media organisations. Although the clusters were different, the interactions between the clusters manifested when major controversies were brought up on the platform. For example, the introduction of new grading policies and discussion on syllabus difficulties.

Hashtags such as #SPM and #MalaysiaMadani were among the prevailing hashtags on the platform. The use of these hashtags indicated the connection between SPM discussions, national education, and governance. While national education and governance transcended the discourse, exam pressure and mental health reflected another facet of public concern. "Tekanan" (stress) and "Kesihatan mental" (mental health) signified the growing concerns over student well-being. The standard of education in Malaysia continues to improve over time, driven by evolving societal needs and policies introduced by the Ministry of Education. It is therefore crucial for teachers, parents and school counsellors to stay informed about these changes and their potential impact on students' mental health (Ishak, Ahmad, Abdullah, Ishak, & Jais, 2021). Such frequent keywords indicated the imperative of creating better support systems. Besides students' well-being, public perceptions of SPM exam difficulties and student preparation efforts over the years were compared, as past SPM batches were often featured in the comparison-oriented discussions. In 2016, SPM candidates frequently expressed on Twitter (now X) that the exam questions were particularly challenging, noting that they had to "struggle" to answer them (Adnan *et al.*, 2018). This, in turn, supports the suggestion by Marzaini *et al.* (2024) that eliminating high-stakes exams may help reduce undue stress and anxiety among students, thereby fostering a more supportive and positive learning environment.

The examination of social media discourse has shed light on the key actors, hashtags and topic trends regarding the discussion of SPM examination on social media. The presence of misleading and exaggerated claims also raised concerns about misinformation in the information flow. Although the Ministry of Education and reliable news portals released verified announcements, misleading and exaggerated statements, such as exam difficulty and leaked exam papers, were also found within the shared information flow. Users should employ critical thinking and verify information to prevent the spread of misinformation (Roberts and Hu, 2018). A similar observation is found by Rosmani *et al.* (2020), who posited that with technology, there are no boundaries when it comes to accessing both reliable and misleading information. Therefore, staying vigilant about the information gathered from the Internet is essential (Rosmani *et al.*, 2020). This is further supported by Balakrishnan (2022), who noted that the majority of young adults tend to share misinformation and often lack the skills to differentiate between accurate and false information. Similar to misinformation and exaggerated statements, criticism also gained virality on the platform. This notion is shared by Wang *et al.* (2021) that retweeting dynamics play a key role in disseminating crisis-related information, underscoring the platform's ability to rapidly reach wide audiences. Content such as tweets that gained higher engagement than official government statements thrived in criticising the education system and highlighting the struggles of students. The virality of sensational content showed that there is an imperative need for proactive and transparent communication from the government to contain reliable information and curb misinformation.

6. Conclusion

This study contributes to an in-depth understanding of discourse revolving around the SPM examination on social media. The study has identified the main social actors at play in social media, namely the government agencies and media organisations. The study has also identified interactive communities in the discourse that conjured around the discussions of education policy, student experiences and statements from media organisations. These interactive communities interacted when major controversies and criticisms arose. Apart from that, the study also pointed out the emphasis on mental health and the pressure associated with

the SPM examination that thrived in the discourse. They were reflected in the mention of student well-being, the need for mental health awareness in Malaysian education guidelines. Another major finding is the presence of risk of misinformation, such as the difficulty of the exam and the leaks of exam papers. This calls for deliberate attention and effective interventions to handle misinformation.

7. Implications

The findings of this study suggest the need for improvement in policy communication. Active engagement between students, parents, educators, and the Ministry of Education through various platforms should be undertaken by the ministry. The engagement between the stakeholders and the government would ensure the credibility of information that reaches to all. The evidence from this study suggests that the media plays an important role in shaping public perception. Therefore, we argue that balanced reporting on SPM-related affairs should be maintained by news organisations, especially on critical issues such as students' stress and changes in education policy. This is because undesired anxiety among students and parents could be heightened if the media sensationalises critical issues such as difficulties in examinations. This study has also raised the importance of mental health in education. Since the discussions of stress-related topics thrived in the discourse, it suggests the imperative need for the integration of mental health assistance into the Malaysian education system. Policymakers could initiate stress management, counselling and exam preparation strategy-oriented initiatives.

8. Limitation

Since the study was limited to the sole focus on Twitter/X, the scope of insights was limited. Other social media platforms, such as Facebook and TikTok, may see more active student discussions. Apart from that, an issue that was not addressed in this study was the emotional sentiment, although the study mapped discourse patterns. The analysis of emotional sentiment could provide insight into the reactions of stakeholders such as students and the public. Thirdly, the study was bound by timeframe constraints; therefore, the findings may not be generalised to portray the long-term trends in the social media discourse of SPM examination.

9. Recommendation

A natural progression of this work is to expand data sources used to understand SPM-related discussions by incorporating multiple social media platforms. Further studies are needed to examine users' sentiment towards similar topics. For instance, the emotional tone of discussions can be systematically processed through sentiment analysis techniques supported by tools, namely, RStudio or comparable analytical software. Sentiment analysis of the discussions would provide policymakers with an understanding of public attitudes and reactions expressed in online discussions. Furthermore, the integration of qualitative methods, including thematic analysis of social media content or interviews with selected users, would provide deeper contextual insights into the meanings and narratives within SPM-related discourse. Serving as a supplement to the structural patterns and metrics generated through SNA, these qualitative findings will elevate the interpretive depth of the study. To compensate for the short timeframe of analysis, further studies may adopt a longitudinal research design to examine SPM discourse and understand public perception, particularly in the patterns and shifts over time.

References

- Adnan, Z. B., Setik, R. B., Rauf, M. F. B. A., Ahmad, N. A. B., Amran, M. F. M., & Kathiravan, Y. A. (2018). Sentiment analysis for 2016's SPM and STPM leavers. In *Proceedings of the 2018*

- International Seminar on Research of Information Technology and Intelligent Systems (ISRITI)* (pp. 433–438). Yogyakarta, Indonesia. doi: [10.1109/ISRITI.2018.8864368](https://doi.org/10.1109/ISRITI.2018.8864368).
- Ahmed, W., Meier, H., Smith, M. (2022). NodeXL - Twitter social media network insights in just a few clicks. In A. Quan-Haase & L. Sloan (Eds.), *The SAGE handbook of social media research methods* (2nd ed., pp. 487–502). SAGE. doi: [10.4135/9781529782943](https://doi.org/10.4135/9781529782943)
- Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly*, 45(3), 425–455. doi: [10.2307/2667105](https://doi.org/10.2307/2667105)
- Aldekhyyel, R. N., Binkheder, S., Aldekhyyel, S. N., Alhumaid, N., Hassounah, M., AlMogbel, A., & Jamal, A. A. (2022). The Saudi ministries twitter communication strategies during the COVID-19 pandemic: A qualitative content analysis study. *Public Health in Practice*, 3, 100257. doi: [10.1016/j.puhp.2022.100257](https://doi.org/10.1016/j.puhp.2022.100257).
- Alenzi, H. A., & Miskon, S. (2024). Government to Citizens Communication via social media platforms: Literature review. *International Journal of Academic Research in Business and Social Sciences*, 14(5). doi: [10.6007/ijarbs/v14-i5/21610](https://doi.org/10.6007/ijarbs/v14-i5/21610).
- Ali, F. S. (2024). *Education Ministry needs to revamp system which is exam-oriented, memorisation-based*. *Sinar Daily*. Available from: <https://www.sinardaily.my/article/214992/national/education-ministry-needs-to-revamp-system-which-is-exam-oriented-memorisation-based>
- Atan, M. A., & Norwahi, N. A. (2025). Challenges and opportunities of using Twitter data in educational discourse research: A methodological reflection from the Malaysian ODL context. *International Journal of Research and Innovation in Social Science*, IX(IV), 3073–3083. doi: [10.47772/ijriss.2025.906000226](https://doi.org/10.47772/ijriss.2025.906000226).
- Ayu Lestari, D., Primagara, M., Aulia Sari, S., Meilina, A., Fauziah, S., Irfany Sugesti, A., . . . Diva Salwi, A. (2024). Meme culture: A study of humor and satire in digital media. *International Journal of Advanced Multidisciplinary Research and Studies*, 4(4), 134–140. doi: [10.62225/2583049x.2024.4.4.3013](https://doi.org/10.62225/2583049x.2024.4.4.3013)
- Balakrishnan, V. (2022). Socio-demographic predictors for misinformation sharing and authenticating amidst the COVID-19 pandemic among Malaysian young adults. *Information Development*, 40(2), 319–331. doi: [10.1177/02666669221118922](https://doi.org/10.1177/02666669221118922).
- Baroutsis, A., & Lingard, B. (2025). *Understanding media influences on education policy in contexts of changing digital media cultures* (pp. 1–15). Learning Media and Technology. doi: [10.1080/17439884.2025.2543424](https://doi.org/10.1080/17439884.2025.2543424).
- Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network analysis in the social sciences. *Science*, 323(5916), 892–895. doi: [10.1126/science.1165821](https://doi.org/10.1126/science.1165821)
- Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2018). *Analyzing social networks* (2nd ed.). London: SAGE Publications.
- Bukhari, S., Hamid, S., Ravana, S. D., Kurnia, S., Chang, S., Norman, A. A., & Abdul Ghani, N. (2020). The use of Facebook by international students for information-seeking in Malaysia: A social network analysis. *Libri*, 70(3), 251–268. doi: [10.1515/libri-2019-0033](https://doi.org/10.1515/libri-2019-0033).
- Burt, R. S. (1992). *Structural holes: The social structure of competition*. Harvard University Press. doi: [10.2307/2393118](https://doi.org/10.2307/2393118).
- Carolan, B. V. (2013). *Social network analysis and education: Theory, methods & applications*. SAGE Publications. doi: [10.4135/9781452270104](https://doi.org/10.4135/9781452270104)
- Focus Malaysia (2025). MP's call to abolish school exams divides opinions; many argue it breeds competitiveness. Available from: <https://focusmalaysia.my/mps-call-to-abolish-school-exams-divides-opinions-many-argue-it-breeds-competitiveness>
- Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Berkeley and Los Angeles: University of California Press.
- Goritz, A., Kolleck, N., & Jörgens, H. (2019). Education for sustainable development and climate change education: The potential of social network analysis based on Twitter data. *Sustainability*, 11(19), Article 5499. doi: [10.3390/su11195499](https://doi.org/10.3390/su11195499)

- Grandjean, M. (2016). A social network analysis of Twitter: Mapping the digital humanities community, *Cogent Arts & Humanities*, 3(1), Article 1171458. doi: [10.1080/23311983.2016.1171458](https://doi.org/10.1080/23311983.2016.1171458)
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6), 1360–1380. doi: [10.1086/225469](https://doi.org/10.1086/225469).
- Idris, H., & Ghani, R. A. (2012). Construction of knowledge on Facebook. *The Southeast Asian Journal of English Language Studies*, 18(3), 61–71.
- Ishak, N. A., Ahmad, N. S., Abdullah, S. M. B. S., Ishak, N. H. B., & Jais, S. M. (2021). Level, factor and coping mechanism of depression among adolescents in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 11(2), 508–522. doi: [10.6007/IJARBS/v11-i2/8864](https://doi.org/10.6007/IJARBS/v11-i2/8864).
- Jalal Nori, A. W. (2019). *Seeking paradigm shift in education*. NST Online. Available from: <https://www.nst.com.my/opinion/columnists/2019/11/539871/seeking-paradigm-shift-education>
- Jalli, N. (2025). Viral justice: TikTok activism, misinformation, and the fight for social change in Southeast Asia. *Social Media + Society*, 11(1). doi: [10.1177/20563051251318122](https://doi.org/10.1177/20563051251318122).
- Jasmi, K. A. (2023). *Rethinking education in Malaysia: Moving beyond the exam-based assessment*. Three Hundredth. Available from: <https://threehundredth.com/rethinking-education-in-malaysia-moving-beyond-the-exam-based-assessment/>
- Jing, S. (2021). *Rethinking the indispensability of SPM*. Teach For Malaysia. Available from: <https://teachformalaysia.org/my/rethinking-the-indispensability-of-spm/?utm>
- Johnson, E. M., & Chew, R. (2021). *Social network analysis methods for international development (RTI Press Research Brief No. RB-0026-2105)*. RTI Press. doi: [10.3768/rtipress.2021.rb.0026.2105](https://doi.org/10.3768/rtipress.2021.rb.0026.2105)
- Jungherr, A. (2015). Twitter use in election campaigns: A systematic literature review. *Journal of Information Technology & Politics*, 13(1), 72–91. doi: [10.1080/19331681.2015.1132401](https://doi.org/10.1080/19331681.2015.1132401).
- Kasmani, M. F. (2024). Social media as an online public sphere: A study among the first-time Malay voters. *Kajian Malaysia*, 42(2), 29–50. doi: [10.21315/km2024.42.2](https://doi.org/10.21315/km2024.42.2)
- Kirkpatrick, C. E., & Lawrie, L. L. (2024). TikTok as a source of health information and misinformation for young women in the United States: Survey study. *JMIR Infodemiology*, 4, e54663. doi: [10.2196/54663](https://doi.org/10.2196/54663).
- Kwecko, V., De Toledo, F. P., Devincenzi, S., De Ortiz, J. O. S., & Da Botelho, S. S. C. (2020). Analysis of the feelings of the population's opinion in social media: A look at education. In *Proceedings of the Frontiers in Education Conference (FIE)*. 1–9. doi: [10.1109/FIE44824.2020.9274047](https://doi.org/10.1109/FIE44824.2020.9274047)
- Lasi, M. A., & Basiran, I. (2021). A study on the impact of government using social media as medium in sharing information to public. *Malaysian Journal of Social Sciences and Humanities*, 6(3), 352–364. doi:[10.47405/mjssh.v6i3.711](https://doi.org/10.47405/mjssh.v6i3.711).
- Li, H. (2024). Post-pandemic reflections: A literature review of the digital divide in online learning in pandemic. 1–43, [Preprint]. doi: [10.35542/osf.io/qug4h](https://doi.org/10.35542/osf.io/qug4h)
- Lin, Z., Zhang, Y., Gong, Q., Chen, Y., Oksanen, A., & Ding, A. Y. (2021). Structural hole theory in social network analysis: A review. *IEEE Transactions on Computational Social Systems*, 9(3), 724–739. doi: [10.1109/tcss.2021.3070321](https://doi.org/10.1109/tcss.2021.3070321)
- Marzaini, A. F. M., Yusoff, S. M., Zakaria, N., Basal, M. H., Sharil, W. N. E. H., & Supramaniam, K. (2024). A discovery on Malaysian ESL teachers' adherence to policy mandates in classroom-based assessment practices. *Malaysian Journal of Learning and Instruction*, 21(1), 249–284. doi: [10.32890/mjli2024.21.1.9](https://doi.org/10.32890/mjli2024.21.1.9)
- Mohamad, H. A., Abd Rashid, M. H., Abd Rahman, A. L., Md Zolkapli, R. B., Hasan, H. R., & Ravinthra Nath, P. (2024). Secondary English grade as a predictor of students' entrance English competence and programme placement. *Quantum Journal of Social Sciences and Humanities*, 5 (5), 342–352. doi:[10.55197/qjssh.v5i5.486](https://doi.org/10.55197/qjssh.v5i5.486).

- Mohd Radzi, N. A., Rosaidi, N. A., Abdul Rahman, A., Mohamad Sazali, N. A. S., & Rastom, R. (2024). SPM leavers: To study or not to study? *International Journal of Modern Education*, 6(21), 564–576. doi: [10.35631/ijmoe.621041](https://doi.org/10.35631/ijmoe.621041)
- Njonge, T. (2023). Influence of psychological well-being and school factors on delinquency during the COVID-19 period among secondary school students in selected schools in Nakuru county: Kenya. *International Journal of Research and Innovation in Social Science*, 7(2), 1175–1189. Available from: <https://ideas.repec.org/a/bcp/journal/v7y2023i2p1175-1189.html>
- Noorman, N. S. I., Jaafar, E. N. K., Amiruddin, N. A. N., Khairul Azman, M. K. H. B., Ramlan, A. F., Herdiansah, A. G., & Djuyandi, Y. (2024). Social media's effect on youth participation in Malaysia's general election 15th. *Aliansi: Jurnal Politik, Keamanan Dan Hubungan Internasional*, 3(3), 118–124. doi: [10.24198/aliansi.v3i3.58603](https://doi.org/10.24198/aliansi.v3i3.58603).
- Norfarah, N., Siti-Nabiha, A. K., & Samsudin, M. A. (2022). Social network analysis to identify influencer in Twitter conversation on SMEs in times of COVID-19 pandemic. In B. Alareeni, & A. Hamdan (Eds.), *Financial technology (FinTech), entrepreneurship, and business development. ICBT 2021* (Vol. 486, pp. 439–452). Cham: Springer. doi: [10.1007/978-3-031-08087-6_31](https://doi.org/10.1007/978-3-031-08087-6_31).
- Ong, L. M. T., Lei, M. Y., & Lee, A. S. (2015). Malaysian and Singaporean students' affective characteristics and mathematics performance: Evidence from PISA 2012 *SpringerPlus*, 4(1), Article 563. doi: [10.1186/s40064-015-1358-z](https://doi.org/10.1186/s40064-015-1358-z)
- Onyancha, O. B. (2023). Mapping media and information literacy skills during and after COVID-19, with special reference to online education, and commerce and trade. *Journal of Media Literacy Education*, 15(3), 93–109. doi: [10.23860/JMLE-2023-15-3-8](https://doi.org/10.23860/JMLE-2023-15-3-8).
- Othman, I. W., Mokhtar, S., Lebai Ahmad, M. K., Diming, R., Ag Bakar, K., & Yusoff, M. S. (2023). Decision dilemmas: Higher education pursuits or workforce entry among SPM graduates. *International Journal of Entrepreneurship and Management Practices*, 6(23), 190–223. doi: [10.35631/ijemp.623014](https://doi.org/10.35631/ijemp.623014).
- O'Sullivan, N. J., Nason, G., Manecksha, R. P., & O'Kelly, F. (2022). The unintentional spread of misinformation on 'TikTok'; A paediatric urological perspective. *Journal of Pediatric Urology*, 18(3), 371–375. doi: [10.1016/j.jpuro.2022.03.001](https://doi.org/10.1016/j.jpuro.2022.03.001).
- Rajput, N. H., Noonari, N., Bukhari, S. M. A., Dehraj, M. A., & Rajput, J. A. (2020). Exploring the impacts of COVID-19 pandemic on education divide in Pakistan. *Journal of Pharmaceutical Research International*, 32(33), 32–39. doi: [10.9734/jpri/2020/v32i3330946](https://doi.org/10.9734/jpri/2020/v32i3330946).
- Rosli, A. S. M., Rahim, A. Z. F. A., Sukiman, N. S. S., Idris, N., Jamri, M. H., & Ridzuan, A. R. (2025). The level of media literacy in a post-pandemic. *E-Journal of Media & Society*, 8(1), 69–75. Available from: <https://journal.uitm.edu.my/ojs/index.php/e-JOMS/article/view/4968>
- Roberts, M. C., & Hu, M. (2018). Twitter use at the 2016 conference on the science of dissemination and Implementation in health. *Implementation Science*, 13, 34. doi: [10.1186/s13012-018-0723-z](https://doi.org/10.1186/s13012-018-0723-z).
- Rosmani, A. F., Mutalib, A. A., & Sarif, S. M. (2020). The evolution of information dissemination, communication media and technology in Malaysia. *Journal of Physics Conference Series*, 1529(2), 022044. doi: [10.1088/1742-6596/1529/2/022044](https://doi.org/10.1088/1742-6596/1529/2/022044).
- Samsudin, M. A., Halim, L. A., Syukri, M., Tiew, C. C., & Putri, E. S. (2025). Understanding the flow of information on Malaysian and Indonesian educational concerns in the YouTube realm: The social network analysis and epistemic network analysis. *Journal of International Cooperation in Education*, 27(2), 157–173. doi: [10.1108/jice-04-2024-0025](https://doi.org/10.1108/jice-04-2024-0025).
- Sarikaya, A. K. (2022). The significance of digital and media literacy in the COVID-19 period. In *EJER Congress Conference Proceedings* (pp. 15–28). Available from: <https://files.eric.ed.gov/fulltext/ED624175.pdf>
- Supovitz, J., & Reinkordt, E. (2017). Keep your eye on the metaphor: The framing of the Common Core on Twitter. *Education Policy Analysis Archives*, 25, 30. doi: [10.14507/epaa.25.2285](https://doi.org/10.14507/epaa.25.2285).
- Teach For Malaysia. (2025). Beyond exams: Rethinking assessments towards purposeful learning. *Teach For Malaysia*. Available from: <https://teachformalaysia.org/beyond-exams-rethinking-assessments-towards-purposeful-learning/>

- Tetteh, P. K., & Kankam, P. K. (2024). The role of social media in information dissemination to improve youth interactions. *Cogent Social Sciences*, 10(1), 2334480. doi:[10.1080/23311886.2024.2334480](https://doi.org/10.1080/23311886.2024.2334480).
- Valentia, T. R. (2023). Digital divide and digital literacy during the COVID-19 pandemic. *Scriptura*, 13(1), 69–78. doi: [10.9744/scriptura.13.1.69-78](https://doi.org/10.9744/scriptura.13.1.69-78).
- Van de Werfhorst, H. G., Kessenich, E., & Geven, S. (2022). The digital divide in online education: Inequality in digital readiness of students and schools. *Computers and Education Open*, 3, 100100. doi: [10.1016/j.caeo.2022.100100](https://doi.org/10.1016/j.caeo.2022.100100).
- Wang, B., Liu, B., & Zhang, Q. (2021). An empirical study on Twitter's use and crisis retweeting dynamics amid COVID-19. *Natural Hazards*, 107(3), 2319–2336. doi: [10.1007/s11069-020-04497-5](https://doi.org/10.1007/s11069-020-04497-5).
- Whittington, R. (2010). Giddens, structuration theory and strategy as practice. In L. Golsorkhi, L. Rouleau, D. Seidl, & E. Vaara (Eds.), *The Cambridge handbook of strategy as practice* (pp. 109–126). Cambridge University Press.
- Wok, S., Idid, S. A., Misman, N., & Rahim, S. A. (2012). Social media use for information-sharing activities among youth in Malaysia. *Journalism and Mass Communication*, 2(11), 1029–1047. doi: [10.13140/2.1.2299.4560](https://doi.org/10.13140/2.1.2299.4560).
- Yu, Y. (2025). Misinformation and disinformation on TikTok. *Academic Journal of Management and Social Sciences*, 11(1), 326–329. doi: [10.54097/89m28748](https://doi.org/10.54097/89m28748).
- Zhou, Z. (2024). A sentiment analysis of user's comments on higher education topics on social media. *Interdisciplinary Humanities and Communication Studies*, 1(10), 660–666. doi: [10.61173/6jq5ce18](https://doi.org/10.61173/6jq5ce18).

Further reading

- Lee, S. (2023). Address absenteeism among SPM candidates. *The Sun*. Available from: <https://thesun.my/opinion-news/address-absenteeism-among-spm-candidates>

Corresponding author

Darshnee Muniandy can be contacted at: darshneem@utar.edu.my