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Examination of Digital Citizenship Level and Its Relationship to Holistic Wellness among High School Students in Malaysia

Aminuddin Hassan, Nur Atikah Ahmad, Sharifah Intan Sharina Syed Abdullah

Faculty of Educational Studies, Universiti Putra Malaysia

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Abstract

The creation of a new online world made learning and living beyond the imaginary that demand digital citizenship practices to warrant the ability to cope with constantly evolving online challenges and risks, such as psychological issues, cyber perpetrators, and cyber victimisation issues. Despite digital citizenship active immersion in today's education world, little attention has been paid to investigating how these immersions have shaped the digital citizenship practice level of high school students, particularly in the Malaysian context. Little is also known about digital citizenship's relationship with this vulnerable group's holistic wellness. Hence, this study examines Malaysian students' perception of their digital citizenship practices in nine elements. Using multistage probability sampling techniques, 398 students from the Central Region States were sampled. Findings revealed, students were moderately practising digital citizenship, and the most infrequent elements are Digital Access and Digital Health and Wellness. Shockingly, 90% of students indicated they never joined any initiatives related to internet safety knowledge, and 78.6% never attended any basic ICT literacy or Computer Science classes provided at the school. Findings also suggest frequent practising digital citizenship significantly contributes to students' wellness. Recommendations are further discussed in this paper.

Keywords: Digital Citizenship, High School, Wellness, Malaysia

Introduction

Extensive efforts to incorporate technology in education have revealed potential risks and emerging concerns associated with its use. The online learning environment exposes adolescents to various online dangers, which leads to increased unwanted digital issues. For example, issues related to cyber perpetrator and cyber victimisation include online misconduct, creating inappropriate content or leaving a digital footprint, identity theft, plagiarism, cyberbullying, sexting, and cyber grooming. In addition to wellness issues such as addiction, health problems, posture and vision issues, technostress, depression, social

withdrawal, and online suicide warrants serious attention (Doumas & Midgett, 2023; Judi et al., 2013; Lee et al., & Cheng, 2014; Ministry of Health Malaysia, 2017). In Malaysia, cyberbullying has been identified as a significant factor contributing to high-profile suicides and the prevalence of suicidal behaviours among adolescents (Basyir & Perimbanayagam, 2020; Fadhlizz et al., 2022). Exposure to digital issues not only impacts students' physical and mental health but also affects their academic performance (Kowalski & Limber, 2013; Ngo et al., 2021). Hence, intervention is urgently needed to address the rapidly evolving digital issues before worsening.

Background

The digital citizenship concept was introduced to counter digital issues and nurture school students to be digitally resilient to online risks. It promotes the knowledge and practices needed to explore the online environment for lifelong learning and create awareness to morally and ethically participate online by using digital technology safely, respectfully, responsibly, and meaningfully. In addition, studies have proven a significant positive impact of digital citizenship on digital issues (Althibyani & Al-Zahrani, 2023; Dunaway & Macharia, 2021; Macharia & Dunaway, 2022; Rahim, 2021; Si & Lee, 2022; Zhong et al., 2021).

Consequently, there has been a significant rise in global initiatives and responses aimed at promoting digital citizenship, focusing on its incorporation into educational settings. Integration can be observed in multiple ways, including curriculum development, policy implementation, educational games, teaching and learning modules and resources, and specific program implementation (MOE Singapore, 2014; Soriani, 2018; Tadlaoui-Brahmi et al., 2022; Tapingkae et al., 2020; UNESCO, 2015, 2016). In Malaysia, digital citizenship has been integrated into the national curricula through subjects like ICT Literacy, Basic Computer Literacy, and the recently introduced Basic Computer Science. In addition to various initiatives such as the Smart School Strategic Plan 2016-2020, Circular Letter of Digital Use Guidelines, Click Wisely Campaign, KITA Siber, CyberSAFE program, Sebenarnya.my portal, Community Internet Centre, National Cybersecurity Challenge, NICTSeD competition, and the Digital Citizenship Module and Cyber Ethic Module, efforts have been made to equip school students with knowledge and training in digital citizenship and cyber safety (Ahmad & Razali, 2023; Digi Telecommunications, 2017; Susanty et al., 2019; UNESCO, 2015).

Despite the active implementation of digital citizenship initiatives, there is limited understanding of how these initiatives have influenced positive online behaviour and digital citizenship practises among school students. Students may possess knowledge of digital citizenship guidelines but may not consistently apply the knowledge in their practice (Hui & Campbell, 2018).

Moreover, the scarcity of previous research and the inconsistent results only partially contribute to our understanding of the extent of digital citizenship practise among school students, specifically in Malaysia. A few studies measured the digital citizenship of school students in Malaysia, such as the National Cyber Security Awareness Survey (NCSAS) 2016, the National Survey Study CyberSAFE (NSSC) 2015, the Digital Competency Scale (DCS) 2017, and the SSQS Rating. The NCSAS (2016) assessed digital citizenship practise in 4099 secondary school students by examining their engagement in risky behaviours, such as sending offensive messages, while less measuring how they have been practising good behaviour. The study revealed that students practiced digital citizenship by taking precautions against online

security risks, having a different password for each account, and telling parents or authority bodies if they faced any online threats. Moreover, most school students are aware of appropriate and inappropriate internet behavior.

In 2015, NSSC conducted a large-scale survey of 18,000 students nationwide (ages 13-15) and found that students were resilient in facing online challenges. Similarly, a study of 400 youths in four districts of Selangor, namely Hulu Langat, Serdang, Sabak Bernam, and Klang, discovered that students' participation in cyberbullying activities was low (Saharrudin et al., 2019). Thang et al (2020) also discovered that most 562 respondents (aged 16) are aware of online risks and are unlikely to be subjected to any online dangers or cyberbullying. Respondents were never asked for intimate photos, nor had they sent intimate content to anyone. The current study found that high school students have good digital citizenship and are aware of online risks and dangers (Maliki & Bahari, 2023; Thang et al., 2020; Zuki et al., 2022).

However, these findings are contradicted by other studies. According to Ipsos (2018), Malaysia ranks second in Asia for the highest reported incidents of cyberbullying among young people. A study conducted on adolescents residing in Klang Valley, Selangor, Penang, and Perak revealed that many who spent 2-5 hours online daily experienced cyber victimisation and indicated cyberbullying is still a prevalent issue (Balakrishnan, 2015; Sivabalan et al., 2020; Waheed, 2019; Yusuf et al., 2021; Yusuf et al., 2019).

In addition, 3 in 10 respondents of 13,845 students were found to be victims of cyberbullying, and a large number of them were unable to protect themselves online (Digi Telecommunications, 2014, 2015; UNICEF, 2018). Despite being aware of the potential risks associated with online activities, students tend to exhibit inadequate protection and safety measures. Most of them were at risk of online threats as they were moderately aware of the consequences of their digital footprint, but their awareness of cybercrime had not increased despite all digital citizenship campaigns and initiatives (Pitchan et al., 2019; Wook et al., 2019; Zain et al., 2015). Moreover, Internet legalisation in Malaysia does not require internet service providers to employ technical measures to mitigate the potential risks of online content to these youngsters (Daud & Abd Jalil, 2017).

After all, the contradictory findings might be due to differences in digital citizenship conceptualisation and theories used and different perspectives from where digital citizenship is being viewed. The differences are also likely due to the various instruments used in measuring various types of digital citizenship, such as knowledge or awareness, attitude or skills, and behaviour or practise. The differences in how digital citizenship is operationalised in the instruments developed in other studies may likely be less effective in different study contexts if not retested for cultural validation. As a result, the obtained findings and conclusions may misinterpreted (DeVellis, 2017; Furr, 2011).

Additionally, certain digital citizenship instruments and concepts are subject to dispute. Some studies used instruments with limited validation evidence, needed theoretical foundations, and were outside adequate discipline practice of scale development research (Chen et al., 2021). In scale development research, rigorous practices are taken to develop items. It involves drawing from robust theoretical frameworks, conducting comprehensive literature

reviews, and relying on empirical evidence. The placement of items, layout design, number of wordings, and location of demographic questions are carefully considered and not determined haphazardly, as this could lead to psychometric errors (McCoach et al., 2013).

Hence, a thorough analysis of each item's relevance to the intended concept should be performed to ensure the instrument's effectiveness in measuring the concept. Moreover, the suitability of the instruments used in previous research is disputable for measuring today's digital citizenship practice to effectively cope and be resilient to today's rapidly evolving digital issues. Certain items may become outdated and require regular revision to adapt to the ever-changing set of digital citizenship practises necessary for addressing today's online challenges.

Therefore, due to the aforementioned conflicting findings, the extent of students' involvement in cyber perpetration and victimisation has been uncertain, making it challenging to understand the current state of digital issues fully. As a result, this has complicated the implementation of future interventions. Hence, this study attempts to investigate digital issues among school students by measuring high school students' digital citizenship practices to understand the extent to which Malaysian digital citizenship initiatives have shaped their daily positive online participation. Using a digital citizenship model that was purposely designed and conceptualised for this group from the educational technology perspective, this study intends to answer the following research questions

1) What are the students' perceptions of digital citizenship practice level?
2) Do students' digital citizenship practice levels differ according to their demographic background?
3) Is students' digital citizenship practice level significantly related to holistic wellness?

Literature Review

Definition & Model

Digital citizenship was defined early as the responsible and suitable norm of behaviours related to the effective use of technology (Ribble, 2008). ISTE (2018) redefined the digital citizenship concept by implementing new standards for students in the United States that outlined digital citizenship is awareness of the rights, challenges, and opportunities offered in the online world by behaving safely, legally, and ethically. Since then, the concept began gaining traction among academics and stakeholders, and the Nine Digital Citizenship Elements theory began to integrate widely. The nine elements comprise digital access, digital commerce, digital communication, digital etiquette, digital law, digital literacy, digital health and wellness, digital rights and responsibility, and digital security (Ribble, 2011).

The theory was developed from the educational technology perspective, focusing on technology's negative impact. It aims to address concerns about the potential impact of technology usage on K -12 students by considering various digital issues associated with this group and proposing educational and training approaches to mitigate them. It concerns practises that could shield them from potential online dangers. Digital citizenship instruments that develop from this lineage could be seen in (Al-Zahrani, 2015; Elçi and Sarı, 2016; Hui and Campbell, 2018; Isman and Gungoren, 2014; Kim and Choi, 2018; Kuş et al., 2017; Mahadir et

al., 2021; Nordin et al., 2016; Phornprasert et al., 2020; Ruenphongphun et al., 2022; Piceci et al., 2021).

Meanwhile, other perspectives were looking at digital citizenship from the positive impact of technology and how technology could improve a citizen's participation in the online world, such as transforming and enhancing "offline" political participation into "online". It focuses on practises that can increase individual participation to benefit from it. Digital citizenship instruments derived from this lineage were observed in Jones and Mitchell (2015) and mostly used in past studies by (Choi et al., 2017).

Previous literature reviews have examined various conceptualisations of digital citizenship (Ahmad et al., 2021; Chen et al., 2021; Cortesi et al., 2020; Jørring et al., 2018). However, the applicability of these digital citizenship concepts for this study is limited. This is because only a few elements of digital citizenship are considered; the sample majority are among tertiary students with different cognitive abilities than secondary school students. Additionally, there is a lack of a comprehensive theoretical foundation and inadequate focus on affective aspects such as spirituality, which is one of the goals in cultivating future Malaysian characteristics (Hassan & Yew, 2013).

As the gaps observed when the reported digital citizenship practises levels in previous Malaysian studies showed moderate to high levels, but still, psychological-related issues were highly reported when it should have been reduced if digital citizenship had been practised frequently. Considering the limitations, the Digital Citizenship Measurement Model (MyDC) (Figure 1) was used to measure their current digital citizenship practices in Malaysia. MyDC was purposely developed by Ahmad (2023) for secondary school students and was conceptualised based on the underpinning theory of Nine Elements Digital Citizenship (Ribble, 2011) with the integration of psychological theories, the theory of wellness, and the theory of resilience (Ahmad et al., 2021; Ahmad, 2023).

The combination of the theories guides the expansion and detailing the definition of each element into subelements to ease measuring the concept of digital citizenship by improving and strengthening the psychological factor as an individual's core internal resources to reduce or change adverse online outcomes into positive ones (Ahmad et al., 2021; Demiroğlu & Taş, 2021; Ghazali et al., 2017; Safaria & Bashori, 2021; Shaver et al., 2022). These psychological theories emphasise on confronting online risks in a moderately level could enhance students benefited from online participation rather than avoiding the online risks at total. For instance, avoiding and forbidden students from using smartphones no doubt could protect them from the negative impact of technology use, however, they would be losing lots of opportunities and benefits offered by the technology use. Hence, proper digital citizenship practices are necessary to equip them with making technology a "good servant" rather than a "bad master".

MyDC was designed to adapt and parallel the characteristics of Malaysian citizens that are supposed to be nurtured, as stated in Malaysia's mission and vision of education (i.e., National Educational Philosophy, 1964). MyDC incorporates Eastern values, such as spirituality and devotion to God, to produce value-driven citizens before political literacy and active national democratic participation, as political participation is restricted for this age group under the

Malaysian University and University College Act 1971 (Ahmad et al., 2012). The spiritual element plays a crucial role in the formation of new citizens in Malaysia. Hassan and Yew (2013) identified values practises, good manners, noble qualities, and holistic wellness as Malaysia's fundamental education components. Hence, MyDC incorporates spiritual and digital resilient coping across its digital citizenship indicators.

Therefore, from MyDC conceptualisation, digital citizenship is defined as the practise of meaningfully using technology to empower an individual's and a society's wellness by enabling digital resiliency in online active participation (Ahmad, 2023). Young digital citizens are expected to be able to not only self-control themselves from engaging in any cyber perpetrator act but also able to protect themselves from being victimised by their own misconduct (e.g., addiction or pornography) or from the wrongdoing of others by practising digital citizenship that is with embedded positive spiritual coping strategies. MyDC aims to enhance active digital citizenship by promoting the meaningful use of technology for personal and social responsibilities. This involves purposefully using technology to actively contribute to the sustainability and wellness of online society, such as being an active upstander when witnessing cyberbullying, reporting online misconduct or inappropriate content, and responsibly disposing of electronic waste to promote environmental sustainability. Therefore, MyDC is used in this study to measure high school students' digital citizenship practice level.

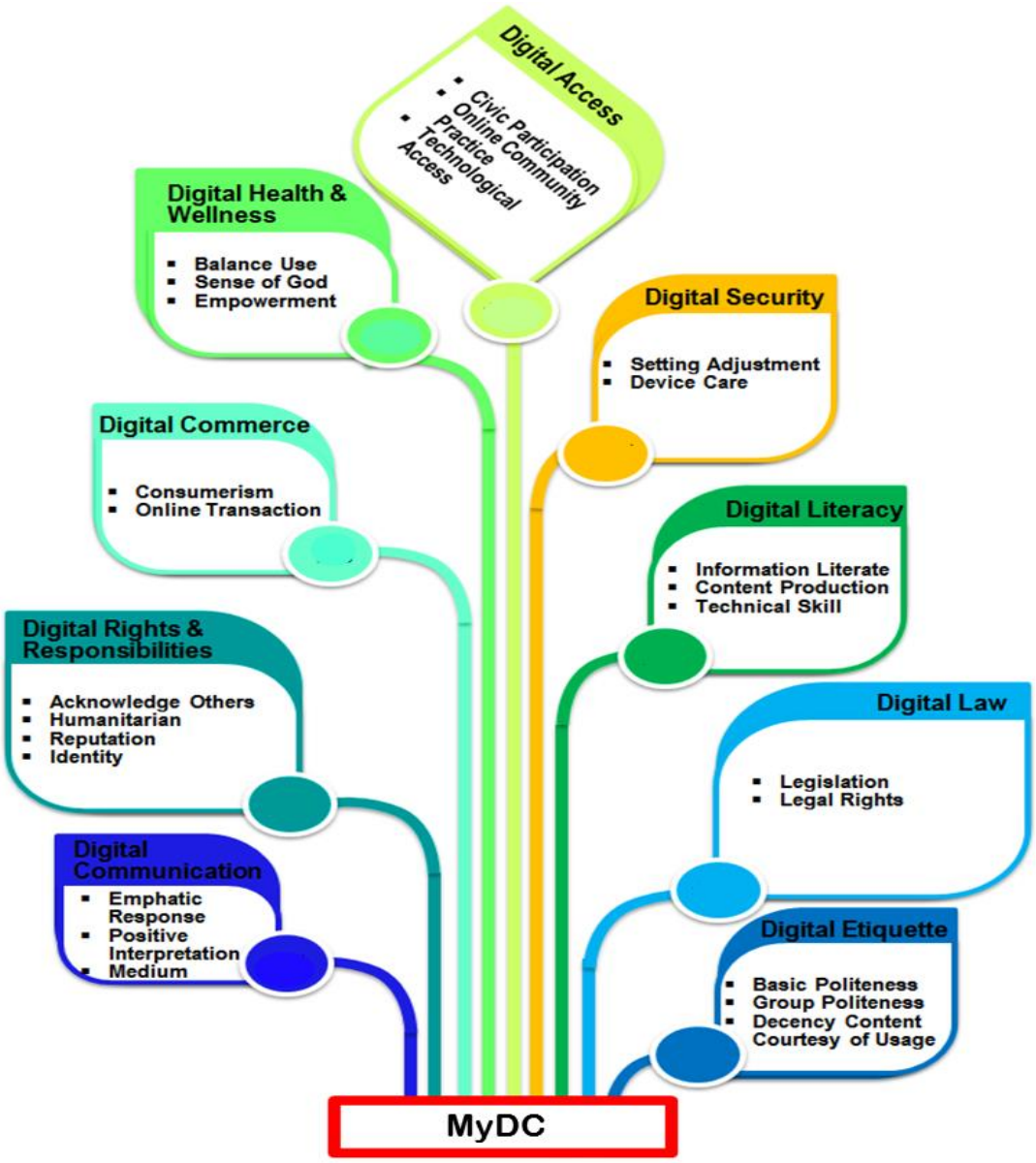

Figure 1. The Digital Citizenship Measurement Model (MyDC)

Methodology

Population and Sample

This study applies a survey design in collecting data among a population of 376, 225 form four students (age 16) of national high schools (secondary schools) in Malaysia. Form four students were chosen due to having adequate maturity to reflect their practice and answer the self-administered survey compared to the lower-level secondary school (junior and middle school) students. Furthermore, this group is amongst the upper-level secondary school (high school) students permitted by the Ministry of Education (MOE) to participate in this study. A minimum sample size of 265 was determined using Cochran's formula (1977), and an additional 50% sample size was added to increase the response rate. Thus, 398 students from 341 schools were sampled in this study.

The procedures of sampling are shown in Figure 2 below. Multistage of probability samplings were opted to increase the generalisation of this study's findings, which, at the first level

(state level), cluster sampling was applied. The 14 states of Malaysia were clustered into five main regions: North, South, Central, East, and Borneo. The Central Region States of Malaysia (Kuala Lumpur (N = 16,547), Selangor (N = 67,739), and Putrajaya (N = 356)) were then further sampled. Central Region was chosen as the state amongst the high number of active young Malaysian internet users who spend more time online; thus, they are greatly exposed to digital issues (Ministry of Health Malaysia, 2017; Isa et al., 2016; Sivabalan et al., 2020; Tsitsika et al., 2014; Woods & Scott, 2016; Zhong et al., 2021).

In the second level (Districts and Types of Schools level), proportionate stratified sampling was applied in selecting the number of students in each district of the three states (Selangor (79%, n = 313), Kuala Lumpur (20%, n = 79), and Putrajaya (1%, n = 6). This sampling technique was also applied at the third stage, the level of choosing types of schools (national regular school (SMK), fully residential boarding school (SMBP), religious school (SMKA), religious assisted school (SMA), technical college (SMKT), vocational college (SMKV), special school (SM Khas), art school (SA), sport school (SS), and guidance school (SB)). This technique opts to access as much as possible of each subgroup at a different strata level that this population constitutes to reduce measurement error and bias and increase generalizability.

Lastly, simple random sampling was applied in choosing the specific students. The respondent's school was randomly picked from the list of schools, and the respondent's class was picked from the form four class of that chosen school. Once the class had been selected, the respondent's name was randomly selected from the students' list name of that chosen class.

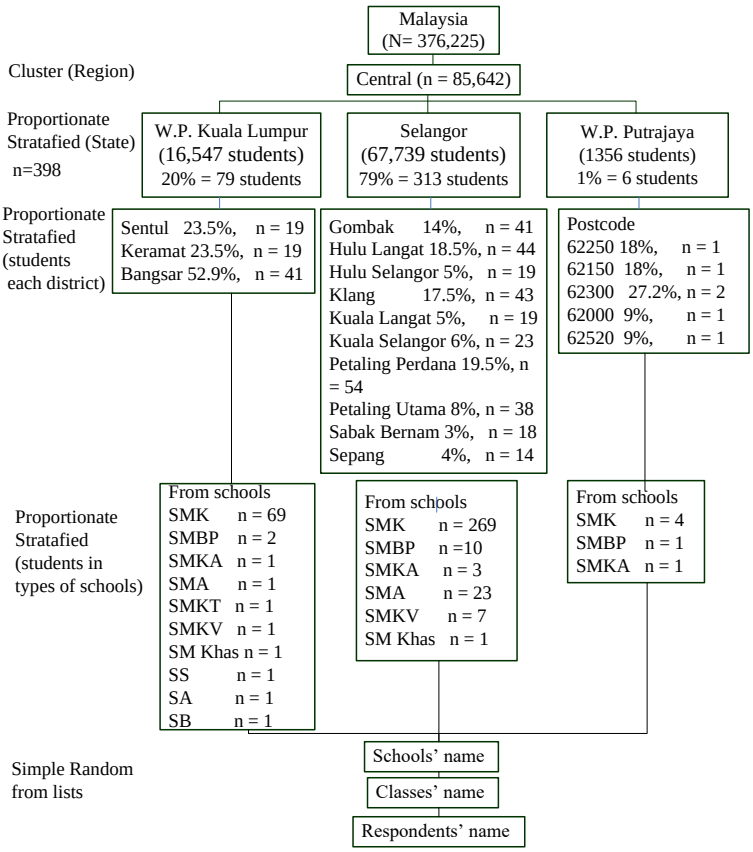

Figure 2. Multi-stages Probability Sampling.

Instrumentation and Data collection

Two instruments were used in this study: the Digital Citizenship Instrument of Secondary School (MyDCi) Ahmad et al (2023) and the Holistic Wellness Assessment (HWA) (Brown & Applegate, 2012). HWA was chosen due to the permission had been received by the developers. Furthermore, it was developed with underpinning theoretical concepts and had been content, construct, and criterion validated (Brown & Applegate, 2012). The short version of HWA was adopted and consists of 32 items. Both MyDCi and HWA were back-to-back translated and administered in the national Malay language.

MyDCi was chosen because it was developed explicitly for the context of secondary school in Malaysia, with higher suitability for this study. Furthermore, MyDCi had higher psychometric properties validation evidence, such as face, content, construct, and criterion validity. MyDCi was face-validated by five students (age 16 from the Central Region) and content validated using the Content Validation Index (CVI) from the feedback of five experts amongst the digital citizenship psychometric experts, ICT and digital citizenship teachers and researchers, and language experts. The MyDCi's CVI results are at a good level (S-CVI = 0.7695 and I-CVI > 0.8).

In addition, 56 items of MyDCi had been validated for its construct with thorough analysis using the Rasch measurement model and met Rasch's assumptions, as shown below in Table 1. MyDCi had been scale calibrated and using a 4-point Likert Scale (1- Rarely (*Sangat Jarang*), 2- Sometimes (*Jarang*), 3- Most of the time (*Selalu*), and 4- All of the time (*Sangat Selalu)).

Table 1
MyDCi Psychometric Properties Based on Rasch's Model.

	KR20	Reliability	Separation	Strata	Unidimensionality	MNSQ	PTMEA	SE	DIF
Item	0.94	0.98	6.81	9.41	40.7%).	0.5 - 1.5	> 0.3	< 0.25	No Bias (Gender)
Person		0.92	3.29	4.72					

Note: MNSQ = Mean Square Infit and Outfit, PTMEA = Point Measure Correlation, S.E.= Standard Error

Data collection procedures began with the approval of conducting research that primarily sought and received from the MOE authorities bodies. Then, the distribution of MyDCi was via mailed envelopes to each participant's school, where the completed MyDCi were then returned to the researcher (as shown in Figure 3 below).

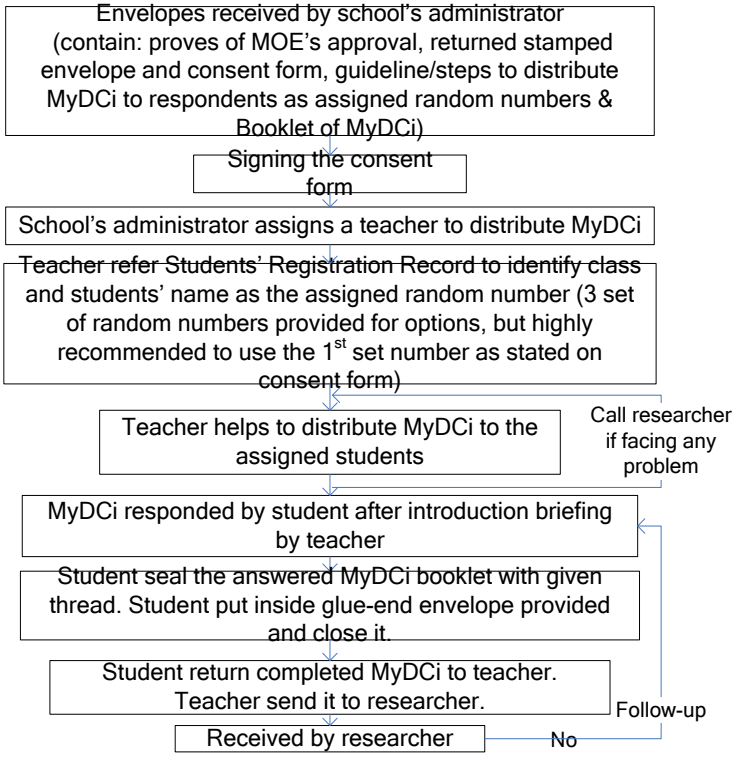

Figure 3. Procedure of Data Collection

Data was collected from November 2021 until May 2022 using mailed paper-pencil survey and an online survey (Google Form). Out of 398 invitation mail posts to each school, 232 responses are received and analysed (19% paper-pencil survey and 81% online survey).

Both methods applied to overcome the limitations of both methods; for instance, online survey is proven for lower responses rate, on-response errors, over-presentation of respondent's perceptions, demotivation to complete the items, and measurement errors by random guessing due to rushing to complete the items (Dillman et al., 1998; Hatlevik et al., 2015; Martins & Lavradio, 2020; Regmi et al., 2016). However, sending the invitation to each school could increase the number of returned responses (Avidas et al., 2022; Argentin et al., 2016). Meanwhile, paper-pencil surveys caused longer periods of data collection that could

be tackled by using online surveys. However, paper-pencil surveys could cater to issues of lack of ICT access, which may be due to incompliant web browsers and internet breakdowns (Johnson & Morgan, 2016; Leon et al., 2022).

Findings and discussion

Descriptive Statistics

Data were analysed (n = 201) using descriptive statistics (frequency percentage, mean, and standard deviation) after being screened for its normality and outliers properties (skewness (-0.024) < ± 1, kurtosis (-0.573) < ± 1, Kolmogorov Smirnow (0.241) > 0.05, and Shapiro-Wilk (0.167) > 0.05) (Hair et al., 2014). Students' demography is tabulated below (Table 2). The proportion of students' gender is almost equal, with 101 male and 131 female.

From the result, most students indicated owning online devices; however, 9.1% did not own online connected devices. This finding suggests that the digital divide regarding device ownership persists even in the states with high penetration of ICT infrastructures. Furthermore, limited online device access contributed to the limited benefit of online participation anywhere and anytime, whenever necessary, especially participation in the online learning platform for learning purposes during pandemic breakout (Ghobadi & Ghobadi, 2013).

Table 2
Respondents' Demography.

	Frequencies	Percentage
Gender		
Male	101	43.5
Female	131	56.5
Race		
Malay	185	79.7
Chinese	31	13.4
Indian	10	4.3
Others	4	1.7
Devices		
None	21	9.1
Smartphone	137	59.1
Computer/ Laptop	7	3.0
Smartphones & Computer/ Laptop	49	21.1
Smartphone & Tablet	4	1.7
Smartphone & Computer/ Laptop & Tablet	6	2.6
Others	8	3.4
Class Stream		
Science	54	23.3
Arts/ Visual arts	24	10.3
Account/ Business/ Economy	66	28.5
Vocational/ Landscape	13	5.6
Home Science/ Fashion	1	0.4
Computer Science	9	3.9

Humanities	3	1.3
Sport Science	5	2.2
Islamic	9	3.9
Internet Safety/ Security Lesson		
No	209	90.1
Yes	22	9.5
Attend ICT-related Class/ Learning		
No	183	78.9
Yes	48	20.7
Use e-Wallet		
No	84	36.2
Yes	147	63.4
Online Seller/ Entrepreneur		
No	212	91.4
Yes	19	8.2

Results also indicate unexpected findings, where most students (90.1%) had never joined any learning related to internet safety or security knowledge and never attended any ICT-related programme or class (78.6%) offered in each school by the MOE. This result confirms the findings by Waheed (2019), where most students indicated that they have not heard of digital citizenship initiatives or national-level online safeguarding programs. Findings may suggest that students may acquire limited knowledge of digital citizenship and be unable to get informed about online misconduct, which might lead students to not knowing that they actually had aggressed or wronged anyone (Yusuf, 2021).

Interestingly, despite their low attendance to any digital citizenship or ICT literacy-related initiatives, the result showed that 63.4% of students experienced using e-wallets in purchasing goods online. In addition, 8.2% of students indicated they had experienced selling goods via online platforms. It suggests that young Malaysians are ready to participate in the digital economy environment and ready for contactless payment. This will ease the financial aid from the government to be sent to eligible students; hence, students will not miss benefiting from the aid, as well as payment to any participating cashless merchandise that is growing in Malaysia, even among night market sellers. However, having access to online financial-related activities without proper knowledge and digital citizenship practice to shield them from potential online dangers may expose them to higher financial cyber victimisation issues in the future, especially when they earn their own money, such as being scammed. Hence, further investigation could be brought in future digital citizenship conceptualisation in studying any evolving potential negative impact of this kind of technology practise on school students.

Digital Citizenship Practice Level

Table 3 below shows that students only sometimes practised digital citizenship when using online technology. These findings contradict to study by Maliki and Bahari (2023) and other countries studies, where digital citizenship of school students were reported between moderate to a high level in terms of knowledge and practise (Aldosari et al., 2020; Erdogan & Tonga, 2020; Ghosn-Chelala, 2019; Hassan, 2021; Jwaifell et al., 2019; Komalasari et al., 2023; Prasetiyo et al., 2021; Suson, 2019; Wang et al., 2022).

Table 3
Students' digital citizenship practice level

Construct	Mean	SD.	Frequency level
Digital Access	2.19	0.477	Sometimes
Digital Commerce	2.63	0.709	Sometimes
Digital Communication	2.86	0.529	Sometimes
Digital Etiquette	2.83	0.531	Sometimes
Digital Health & Wellness	2.41	0.532	Sometimes
Digital Law	2.82	0.853	Sometimes
Digital Literacy	2.48	0.511	Sometimes
Digital Rights & Responsibilities	2.41	0.591	Sometimes
Digital Security	2.64	0.549	Sometimes
Overall Digital Citizenship	**2.67**	**0.460**	Sometimes

The digital etiquette (M = 2.83) and digital communication (M = 2.86) were frequently practised by students. Finding echoing the past studies, which these two elements were the highest scored regardless age group and countries (Ananto & Ningsih, 2023; Çebi & Özdemir, 2019; CyberSecurity Malaysia, 2016; Karaduman, 2017; Mahadir et al., 2021; Martin et al., 2020; Mata-Domingo & Guerrero, 2018). These findings may suggest that high school students had internalised these elements as their individual characteristics and values (Krathwohl et al., 1964). These elements were seen improving amongst Malaysian school students, as these elements were at low to medium levels in years before (Digi Telecommunications, 2014). Hence, these elements are recommended to increase the items' difficulty level when measuring digital citizenship practice for future high school students.

Meanwhile, digital access is the least practised by students (M = 2.19). Students were less participate in civic activities that is beneficial for the society. Students were also reported less in participate environmental sustainability online campaign, in which, connectedness to environment could enhance one's spiritual level and well-being (Fisher, 2011).

This indicates that, while students have high levels of technological access, meaningful use of technology in society development is still low. This finding is consistent with previous findings that most digital citizens are still less engaged in online civic engagement, which is critical in developing members of parliament with characteristics of high social responsibilities rather than monetary-based thinking or acting that could harm the country's integrity and safety (Johns, 2014; Jones & Mitchell, 2015; Quinn & Bauml, 2017). The findings of this study also confirm Choi et al (2017) findings that contribution to society is still low and is the most difficult digital citizenship practise.

This study also found digital health and wellness (M = 2.41), amongst less practised by students. The result is coherent with other studies showing these elements were lowerly scored, even for other age groups in other countries (Al-Momani & Alsmadi, 2020; Karaduman, 2017; Martin et al., 2020; Oraif & Samak, 2022) This may explain the rising digital issues related to psychological. In addition, healthcare issues. For instance, if they have low digital health literacy by simply seeking medical advice or myths about health care from the internet and treating themselves without a proper diagnosis by a certified physician. Unable to be aware of the benefits of using online healthcare platforms such as health-related apps

(e.g., "Doctor-on-Call") and online public clinic appointment services may lead to higher healthcare costs, late recognising of early symptoms, and poor well-being (Azlan, 2019; Banos et al., 2016; Lee, Wong, & Lee, 2020; Wartella et al., 2016).

These findings also support the arguments by several scholars on the necessity of intensive focus on the affective aspect, such as spiritual, in the current and future digital citizenship conceptualisation as a way to prepare these vulnerable groups to be digitally resilient in coping with the evolving digital issues, positively (Ahmad et al., 2021; Che Noh & Ab Rahman, 2013; Fleeson et al., 2017; Lucey & Lin, 2020; Shaver et al., 2022; Yadav & Yadav, 2018; Yust, 2014).

Another less practised element by students is digital rights and responsibilities (M = 2.41). Students tended to be passive bystanders rather than digital vigilant or upstanders in fulfilling their social responsibilities in the online community. Furthermore, students were less likely to show their responsibilities in demonstrating their national identity in the online community. Malaysian digital citizen is expected to develop nation character and patriotic spirit, as stated in the Malaysian Blueprint 203-2025 and KSSM curriculum. They should hold their true physical world identity as their citizenship duty of being the little nation ambassador, portraying the nation's honour and protecting its dignity and pride whenever interacting with other users from other parts of the world (Aroff, 2014; Isikli, 2015).

In addition, students are less aware of their privacy issues and disrespect or acknowledge the intellectual properties of others, such as plagiarism, not citing, and using non-permitted online content or usage beyond permitted, which also similarly reported in the past studies (Sari et al., 2022; Thang et al., 2020). Findings suggest that this issue has not been adequately overcome as it persists among school students, even though it has always been highlighted in past digital citizenship studies. Hence, more intervention is needed, focusing on the decrementation of this issue.

Differences in Digital Citizenship Practice Level

Independent t-test and one-way ANOVA analysis were applied to investigate differences in digital citizenship practice level between gender, race, class stream, attendance of internet safety, ICT class, e-wallet usage, and entrepreneurship.

Gender

Table 4 shows significant digital citizenship differences in practises between male and female, particularly in digital commerce, digital communication, digital etiquette, and digital security, where females exercise digital citizenship higher in these four elements. These findings are coherent with past studies that looked at gender, where females reported higher in their digital citizenship practice, such as in making their password safe (Martin et al., 2020; Prasetiyo et al., 2021; Si et al., 2023). However, contradict to other studies that involved other age group respondents, such as high school teachers and tertiary students, reported no significant gender digital citizenship (Choi et al., 2018; Çiftci & Aladağ, 2018; Daher et al., 2022; Djudin & Kartono, 2021; Cemcem et al., 2023; Erdem & Koçyiğit, 2019; Jwaifell et al., 2019). It may be because older males are more likely to reach maturity level as they grow, have higher self-control development, and have higher coping strategies when confronting digital issues (Balakrishnan, 2015; McNicol & Thorsteinsson, 2017).

Table 4
Differences Between Gender And Race.

	Gender				Race					
	Mean				Mean					
	Male	Female	t	Sig.	Malay	Chinese	Indian	Others	F	Sig.
D. Access	2.14	2.22	-1.117	.265	2.16	2.30	2.30	2.43	1.125	.340
D. Commerce	2.41	2.80	-3.745	.000*	2.61	2.61	2.93	3.06	0.952	.417
D. Communication	2.73	2.95	-2.825	.005*	2.85	2.81	2.94	3.35	1.303	.275
D. Etiquette	2.67	2.95	-3.561	.000*	2.81	2.86	2.94	3.40	1.790	.151
D. Health & Wellness	2.34	2.45	-1.322	.188	2.42	2.29	2.52	2.29	0.588	.624
D. Law	2.62	2.97	-2.775	.006	2.81	2.87	2.50	3.45	1.091	.354
D. Literacy	2.38	2.50	-1.494	.137	2.44	2.41	2.48	2.79	0.642	.589
D. Rights & Responsibilities	2.43	2.39	0.468	.640	2.41	2.35	2.36	2.75	0.402	.751
D. Security	2.53	2.73	-2.454	.015*	2.65	2.63	2.50	2.88	1.126	.339
OVERALL	2.55	2.75	-3.884	.000*	2.63	2.70	2.56	3.02	1.130	.272

* at α = 0.05 (two-tailed), df = 200,

Even so, this study's finding somehow strengthens the evidence of the existence of digital issues, the gender digital divide, by means of the beneficial digital usage among Malaysian school students (Ahmad et al., 2019). Gender is found to be a significantly strong predictor of unethical behaviour, so as in moral awareness and online safety behaviour (Nga & Lum, 2013; Rafidah et al., 2014; Tsai et al., 2016). Even though it is acknowledged that this gender discrepancy may be due to factors such as male students tending to rate their perception lower compared to females and higher egoism, this issue indeed needs further attention, especially when males reported higher involvement in online cyber perpetration, misconduct, and suicidal intention (Ghazali et al., 2020; Gini et al., 2014; Lareki et al., 2017; Ministry of Health Malaysia, 2017; Isa et al., 2016).

Race

No significant race or ethnicity differences were observed in digital citizenship practice. However, past studies reported that the Chinese were highly exposed to online risks, as they spend twice higher online time than other race groups, and they tend to be involved in online violent games, online gambling, and internet addiction (Ministry of Health Malaysia, 2017; Soh et al., 2011). On the other hand, other races reported lower well-being, which might also affect their digital resiliency in facing online adversity, such as the prevalence of suicidal ideation reported highest among Indian adolescents in urban areas (Clark et al., 2014; Ministry of Health Malaysia, 2017).

After all, further investigation is needed into race or ethnicity in digital citizenship practice, as it could be a contributing factor to the growth of the digital divide and other digital issues,

particularly in this Malaysia multiracial country (Ghobadi & Ghobadi, 2013; Venkatesh et al., 2012).

Digital Learning

From Table 5, no significant differences were observed in digital citizenship practice compared to those who had joined any internet safety or digital citizenship initiative, such as program, campaign, or online lesson. Furthermore, no significant differences were discovered between those who had taken basic ICT literacy or basic computer science classes. These classes are government initiatives to implement technology education to teach students about technology knowledge, safety, ethical usage, and responsible behaviour via formal education. These classes aim to improve students' digital skills and promote digital citizenship. The goal is to cultivate a generation of digital makers in Malaysia and instill Malaysian citizenship values (Digi Telecommunications, 2017; Ministry of Education Malaysia, 2004, 2015). This study's finding supported the study by Zain et al (2015), where digital citizenship initiatives, such as the KDB, do not reduce the rising statistic of digital crime in Malaysia among this group of students.

Based on this evidence, it may suggest that further evaluation of the digital citizenship initiatives in Malaysia is needed to improve the weak aspect that causes these initiatives less shape the digital citizenship practice of the young digital Malaysian. Efforts could be made to reach wider and more students' involvement by promoting it via the most used or followed social media platform by adolescents (e.g., TikTok) or incorporating ventures with digital influencers. Furthermore, revising the digital citizenship material, concept, or module employed in these initiatives is imperative to ensure alignment with the swiftly evolving landscape of digital issues (Ahmad et al., 2021).

Table 5
Differences between Internet Safety Learning and ICT Class Attendance.

	Internet Safety programme				**ICT class**			
	Mean		t	Sig.	Mean		t	Sig.
	No	Yes			No	Yes		
D. Access	2.17	2.35	-1.390	.166	2.15	2.35	-2.171	.031
D. Commerce	2.62	2.75	-0.692	.490	2.59	2.81	-1.615	.108
D. Communication	2.84	3.04	-1.421	.157	2.83	2.99	-1.666	.097
D. Etiquette	2.83	2.80	0.243	.808	2.80	2.96	-1.564	.120
D. Health & Wellness	2.38	2.72	-2.499	.013	2.38	2.51	-1.324	.187
D. Law	2.82	2.83	-0.053	.958	2.80	2.93	-0.825	.410
D. Literacy	2.44	2.55	-0.856	.393	2.40	2.65	-2.56	.011
D. Rights & Responsibilities	2.39	2.58	-1.245	.215	2.39	2.50	-1.062	.290
D. Security	2.64	2.66	-0.166	.868	2.60	2.84	-2.385	.018
OVERALL	2.65	2.67	-0.187	.852	2.63	2.73	-1.398	.164

* at α = 0.05 (two-tailed), df = 200

E-Commerce Platform Experience

Significant differences in students' digital citizenship practices were found in most elements, except digital etiquette, digital health and wellness, and digital rights and responsibilities, when comparing students' experience of using e-wallets in any e-commerce apps or platform (Table 6).

Table 6
Differences between E-Wallet Usage And Online Entrepreneur Background.

	E-Wallet				Online Entrepreneur			
	Mean		t	Sig.	Mean		t	Sig.
	No	Yes			No	Yes		
D. Access	2.02	2.30	-3.998	.000*	2.18	2.27	-0.647	.519
D. Commerce	2.34	2.82	-4.646	.000*	2.61	2.93	-1.724	.086
D. Communication	2.70	2.96	-3.279	.001*	2.86	2.81	0.345	.731
D. Etiquette	2.72	2.90	-2.314	.022	2.83	2.85	-0.170	.865
D. Health & Wellness	2.29	2.48	-2.437	.016	2.39	2.57	-1.223	.223
D. Law	2.60	2.96	-2.816	.005*	2.83	2.74	0.380	.704
D. Literacy	2.32	2.53	-2.650	.005*	2.45	2.44	0.024	.981
D. Rights & Responsibilities	2.29	2.48	-2.040	.043	2.40	2.51	-0.705	.482
D. Security	2.51	2.73	-2.678	.008*	2.64	2.69	-0.363	.717
OVERALL	2.51	2.73	-3.757	.000*	2.64	2.75	-1.094	.275

* at α = 0.05 (two-tailed), df = 200

Meanwhile, no significant differences were found between students' who had experience being an online seller and those who were not. In Malaysia, one of the educational missions is preparing an entrepreneurial nation among school students to benefit from digital economic participation. Ribble (2011) theorised entrepreneurship under the digital commerce element (i.e., online electronic selling). Entrepreneurship practices should also be included in digital citizenship conceptualisation, as it is now more than ever concerned with the rights and responsibilities of consumers (Ahmad et al., 2021; Richardson & Milovidov, 2019). However, in digital citizenship research, school students' entrepreneurship and consumerism (i.e., purchasing online goods) are still receiving less attention than the tertiary students group.

Relationship of Digital Citizenship and Holistic Wellness

A significant relationship was found between students' digital citizenship practice level and their holistic wellness when investigated using Simple Linear Regression (Table 7). The result suggests that the more frequently digital citizenship being practise, the more holistic wellness could be achieved. Furthermore, digital citizenship explains 31.2% of holistic wellness and is a significant positive predictor of holistic wellness of school students (β= 0.59, t (200) = 6.763, p <0.05).

Table 7
Simple Linear Regression between Holistic Wellness and Digital citizenship Practice Level.

		R	R	Adjusted	SE	Coefficients			t	Sig.
	Mean		Square	R square		β	SE	Beta		
HWA	2.75	0.558	0.312	0.305	0.34513	0.59	0.87	0.558	6.763	0.000

α = 0.05 (two-tailed), df = 200

The findings support the association between cyber perpetration (such as cyberbullying) and cyber victimisation (such as being cyberbullied) with psychological issues related to digital technology among this particular group. This study's findings further support the argument that the concept of digital citizenship should prioritise affective aspects. Insufficient digital citizenship in daily online activities increases vulnerability to online dangers, which in turn contributes to suicidal ideation. (Ahmad et al., 2021; Katapally, 2022; Fadhli et al., 2022).

Hence, the primary concern pertains to K-12 students, who have been exposed to technology since very young. Therefore, it is imperative to incorporate digital citizenship extensively in formal education while simultaneously implementing more extensive programs to educate young citizens than ever before. Furthermore, integrating the spiritual aspect into digital citizenship practises is seen as a novel approach to assisting. It would enhance students' ability to effectively manage online risks that impact their overall well-being in both "offline" and "online" life. (Ahmad et al., 2021;.Demiroğlu & Taş, 2021; Kor et al., 2019; Safaria & Bashori, 2021; Sharma & Arif, 2015; Shaver et al., 2022; Yahaya et al., 2012).

Recommendation

This study's findings might contradict other past digital citizenship studies. Despite all the varieties of findings in digital citizenship studies, re-examination and more investigation are always needed due to the nature of any technology-related research that is rapidly changing; more examination is actually contributing to bringing a clearer picture of the students' digital citizenship, for us to understand it better. In terms of to what extent digital citizenship value had internalised and characterised in their daily online practices when in online environments. Furthermore, via more metanalysis research in the digital citizenship arena, a clear status of digital issues could be traced for future intervention to overcome it before worsening and becoming the online culture and norms by itself, creating a future online society that is less safe for all.

Future research on digital citizenship should look into how affective factors affect digital citizenship. This will help make digital citizenship more effective in addressing the growing number of digital issues among young citizens. The affective aspect could be other than the extensively studied aspects such as self-efficacy and attitude, as these have been extensively studied in various technology-related fields, including digital literacy, digital skills, ICT adoption (such as the UTAUT theory), information literacy, ICT competency, 21st-century skills, and the digital divide.

It is advisable for future research to carefully consider a digital citizenship instrument that aligns with the study's operational definition and perspectives, as different perspectives may have different aims. From a political science perspective, the aim is to increase citizen participation in the online environment, particularly in fulfilling their political literacy duties. From an educational technology perspective, the aim is to equip students with strategies to handle the negative aspects of technology use when they engage online. It is recommended to retest instruments or items in new study settings before drawing conclusions, as they may function differently in different contexts.

Furthermore, future meta-analyses could be beneficial in providing a clear understanding of the concept of digital citizenship so that more improvement could be made on the available digital citizenship concepts, especially on its effectiveness on digital issues. Future researchers could also look into improving digital citizenship practises, especially among people who actively engage in online social media, like Instagram celebrities and online influencers, to positively affect young people who follow them.

This study predicts that an increasing number of school students will be involved in entrepreneurship in the future despite this study's results showing insignificant differences in

this aspect of students' digital citizenship practises. Digital citizenship instruments or concepts should be updated periodically to reflect emerging digital citizenship practice trends. Failure to do so could result in type 2 errors (false-negative results) when measuring the digital citizenship level, which would impede the actual digital citizenship level. It is the norm in technology disciplines to use up-to-date concepts or instruments due to the fast-paced technology environment.

This study used a survey to assess students' digital citizenship practises in terms of perception, which may be exaggerated. As a result, the reported level of digital citizenship may be lower than reported. As a result, more research is needed to confirm these findings. A qualitative method, such as observation with multiple raters, could be beneficial.

Conclusion

The level of digital citizenship practises among secondary school students is at very low to low level (i.e., rarely and occasionally), indicating that students are highly exposed to online risks. Facing online risks without any coping strategies or without any protection or knowledge to reduce the online risks potential harm, may cause severe effect to them and increasing the statistic of digital issues. Therefore, future intervention is hoped to cater digital issues by focusing more on the low practised digital citizenship elements.

Therefore, these findings hope to help stakeholders and policymakers on the elements that require further improvement and attention. This study hopes to contribute to a fruitful discussion about the importance of digital citizenship in nurturing students' holistic wellness. As a result, better Malaysia's future headways drivers of online society could be nurtured, creating a positive online culture as a new digital lifestyle.

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