INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 12, Issue 4, (2023) E-ISSN: 2226-6348

Teachers' Perception of the Suitability of Chinese School Year 6 Mathematics Textbook

Ang Chia Mui & Muhammad Sofwan Mahmud

Faculty of Education Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, Malaysia

Corresponding Author Email: sofwanmahmud@ukm.edu.my

To Link this Article: http://dx.doi.org/10.6007/IJARPED/v12-i4/19677 DOI:10.6007/IJARPED/v12-i4/19677

Published Online: 28 December 2023

Abstract

Textbooks are one of the primary referencing sources in teaching mathematics. Mathematics teachers refer to textbooks to plan their daily teaching. However, the need for a protocol to evaluate the quality of textbooks has raised a question on the suitability of textbooks currently used in schools. Hence, this research aimed to investigate the suitability of the Year 6 mathematics textbook from mathematics teachers' perspectives. The investigation circles the correlation between six aspects: curriculum, discipline, pedagogy, technology, context, and presentation. Through a random sampling strategy, 100 Sarawakian Chinese primary school mathematics teachers responded to the survey form distributed through WhatsApp within a week. Statistical Package for Social Sciences (SPSS) analyzed quantitative data descriptively and analytically. The analysis found that the Year 6 mathematics textbook is highly suitable (min = 3.34). Pearson Correlation analysis also identified moderate positive relationships between curriculum (r = 0.408), pedagogy (r = 0.405), and technology (r = 0.459) aspects. Meanwhile, discipline has weak positive relationships with context (r = 0.378) and presentation (r = 0.335) aspects. Hence, improve the survey item and include qualitative data to enhance the research quality for the suitability evaluation of mathematics textbooks.

Keywords: Teacher's Perception, Suitability, Textbooks, Mathematics, Primary School Standard Curriculum

Introduction

In Malaysia, all pupils are given mathematics textbooks through the Textbook Management System (SPBT), and it has become the primary source of reference for students' learning. From the view of mathematics teachers, a textbook is one reference for daily lesson planning (Cheng & Rosli, 2020; Guan et al., 2022) because the design of the mathematics textbooks aligned with the educational curriculum standard document, or Dokumen Standard Kurikulum Pendidikan (DSKP) in Malay. The DSKPs consist of all the learning standards that define the learning objectives and assessments according to respective subjects. Hence, the mathematics textbook is more likely to be referred to than the more detailed DSKP.

Primary school pupils depend more on textbooks than secondary school pupils. Different textbooks impact teaching and learning differently (van den Ham & Heinze, 2018).

It depends on the suitability of the textbook used. The design of the latest version of the local primary school mathematics textbook referred to the six levels of Bloom's Cognitive Taxonomy. The minimum aim of mathematics learning at the primary school level is to achieve the third level of the taxonomy, which is to apply the learning content in real life. Tan (2018) found that most drill practices from the Year 4 mathematics textbook are at the level of applying and analyzing, which implies that the latest version of primary school mathematics textbooks is achievable with increasing difficulty levels. With that, the quality of mathematics textbooks decides their significance, especially to the teachers who mainly refer to the textbook to plan effective teaching and assessment.

According to the case study (Fan, 2010), a high-quality mathematics textbook should fulfill six essential principles: curriculum, disciplines, pedagogy, technology, context, and presentation. Every principle is closely related to each other. The curriculum principle indicates that the textbook should aligned with the curriculum. The Malaysian Education Ministry designed the curriculum in three versions: Malay is for the national school, and Mandarin or Tamil is for the vernacular schools. Even though the content of the learning in both mathematics textbooks is varied among the national and vernacular schools, all mathematics teachers should have the same teaching goal: to prepare the pupils for a higher level of education afterward.

Discipline, the second principle, implies the capability of mathematics textbooks to prepare a solid foundation in mathematics so that pupils learn and apply their knowledge and skills in daily life. To achieve this principle, the learning content in the mathematics textbook must be comprehensible to most of its users (Fan, 2010). However, many factors could affect the clarity of lesson delivery, such as the structure and depth of language. With that, the designers of mathematics textbooks should have a robust basic knowledge of mathematics to produce a good mathematics textbook.

Pedagogy is the third principle. A good design of textbooks should support mathematics teaching, learning, and evaluation. The design of the content of the mathematics textbook should integrate various pedagogies. Different pedagogy indicates different learning methods, and the options given shall fulfill all kinds of pupils' learning needs (Lindner & Schwab, 2020; Lv et al., 2021; Tomlison, 2014). However, pedagogy integrated into the textbook references the users. It is not a compulsory method of learning. A mathematics teacher has to be creative and innovative in planning their teaching and be flexible and open throughout the learning process to ensure that teachers can overcome all kinds of learning difficulties the pupils face professionally.

The principle of technology implies the significance of integrating technology in mathematics teaching and learning. Nowadays, most places in Malaysia provide electricity and internet connection facilities. The benefits and efficiency of technology-based teaching have been proved in previous research (Abdullah & Hisham, 2019; Harris & Hofer, 2011; Nickl et al., 2022; Talib et al., 2019). Hence, technology integration should be optimized and prioritized in the designation of mathematics textbooks to ease the teaching process so that there is more space for reflecting on improving the teaching and learning of mathematics.

Context principle requires the learning content to be related to cultural, social, and historical aspects. The correlation between mathematics learning in the previous and current context has positively impacted pupils' learning, especially psychologically (Kapofu & Kapofu, 2020). Pupils should embrace mathematics history and seek the meaning of learning mathematics within themselves. The journey of seeking meaning in learning mathematics shall motivate mathematics learning among pupils.

The last principle is presentation, which requires mathematics learning content, including details such as pages, graphic suitability, fonts, instruction, language level, and many more, to show clearly and precisely. This principle has been discussed in detail in the textbook analysis framework by Huang et al. (2022) and the discussion in the research of Boling et al. (2004). This principle plays a vital role in designing primary school mathematics textbooks because a suitable presentation impacts the useability of the textbook itself, especially for primary school pupils.

Problem Statement

Mathematics textbooks present and translate the abstract curriculum into procedural operation so teachers and pupils can implement the learning in reality (Huang et al., 2022). However, the functionality of mathematics textbooks differed among teachers. Lepik dan Viholainen (2015) identified four groups of teachers based on their research on 400 mathematics teachers in Estonia, Finland, and Norway about the mathematics textbooks of their choice. They are teachers who use their textbooks in every lesson, teachers who do not refer to the textbook as their primary tool in teaching, teachers who see their textbooks as a source for drilling practices and homework, and teachers who encourage pupils to learn new concepts from the textbooks. Lepik and Viholainen's findings showed that the different roles of mathematics textbooks are closely related to the suitability of the textbook as a source of teaching reference. Hence, selecting mathematics textbooks that suit the needs of teaching and learning mathematics is significant.

However, the textbook is uniform in Malaysia according to national or vernacular school types (Tan et al., 2018). Due to the lack of technology facilities in the inbound areas, the technology integration in the textbook failed. With that arose the issue of whether the uniform textbook suits all schools, including urban and inbound areas. Furthermore, although there are many studies on the effectiveness of technology-integrated teaching and learning, there needs to be more studies about textbooks as a teaching tool, especially in the Malaysian context. Most current studies on Malaysian mathematics textbooks focus on content analysis (Afiqah et al., 2021; Cheng & Roslinda, 2020; Guan et al., 2022). The findings of these studies need to be revised to holistically support the mathematics textbooks' suitability, effectiveness, and quality. Only recently has a study in the country that evaluates the suitability of the mathematics textbook holistically, especially from the perspective of the mathematics teacher.

Besides, the designers of the mathematics textbooks have yet to refer to the latest research studies that have discussed mathematics teaching and learning problems. The design of the mathematics textbooks solely depends on the curriculum framework provided by the Education Ministry without understanding the significant changes needed in the new curriculum. Thus, the latest mathematics textbooks changed the look while maintaining the content (Singh et al., 2020). One of the causes of this situation is that most of the research related to mathematics textbooks focuses on the secondary school curriculum (Dollah et al., 2019; Liang et al., 2023; Mersin & Karabörk, 2021; Yang et al., 2017). Hence, without research-based insights, the textbook designers did not realize the problem in using their designed textbooks.

The next issue is the need for more clarity on the protocol of textbook publication. The protocol should be shared publicly on the Malaysia Education Ministry website. Compared to our neighbouring countries, Singapore's mathematics textbooks have a high reputation and have been recommended by other countries (Kaur, 2021). Singapore Education Ministry has

referred to the detailed framework of mathematics textbooks before any mathematics textbooks could go for publication (Fan, 2010). Hence, Singapore mathematics textbooks have always been referred to and compared to other textbooks used in other countries (Manopo & Lisarani, 2021; Mersin & Karabörk, 2021, 2022; Ramelan & Wijaya, 2019; Toprak & Fatih Özmantar, 2022; Vicente et al., 2022; Yang et al., 2017). The lack of research on Malaysian primary school mathematics textbooks is a research gap to fill up to improve the quality of primary school mathematics textbooks in the future.

One of the purposes of having mathematics textbooks is to support teaching and pupils learning (Rezat et al., 2021). Although the education curriculum is revised regularly, the suitability of the textbook as a teaching tool has to be determined. Hence, to investigate the suitability of the mathematics textbooks from the perspective of mathematics teachers, this research is done by referring to the 2021 revised version of Chinese vernacular school Year 6 mathematics textbooks. The objectives of this research are to (1) identify the level of suitability of Year 6 mathematics textbooks from the perception of Chinese vernacular school mathematics teachers from the aspect of curriculum, discipline, pedagogy, technology, context, and presentation and (2) to identify the relationship between the aspects of Year 6 mathematics textbook evaluation.

Based on the objectives above, two research questions arose as follows:

1. What is the level of suitability of Year 6 Chinese vernacular school mathematics textbooks from the perceptions of mathematics teachers?
2. Is there a significant relationship between curriculum, discipline, pedagogy, technology, context, and presentation to the suitability of Year 6 Chinese vernacular school mathematics textbooks?

With that, a null hypothesis is formed to answer the second question above:

H_0: There is no significant relationship between curriculum, discipline, pedagogy, technology, context, and presentation to the suitability of Year 6 Chinese vernacular school mathematics textbooks.

Methodology

This research applied a quantitative methodology through a set of online questionnaires. Questionnaires can conveniently collect data quickly (Creswell, 2012). The data collection was to test the hypotheses or answer the research questions based on respondents' opinions on a particular topic of discussion (Gay et al., 2000). The questionnaire could fulfill the needs of this research because it eased the data collection process and minimized the research budget by collecting statistical data from mathematics teachers randomly from all over the state of Sarawak within a short timeframe.

The population of this research was the mathematics teachers who served in the Chinse vernacular schools in Sarawak. The analysis unit for the research was the Chinese vernacular school mathematics teachers who have taught mathematics in the last five years, from 2018 until the present. The purpose of the purposive sampling is to ensure that only the perceptions of teachers experienced with the latest curriculum, the Primary School Standard Curriculum (Revised), will be involved in this research. They were the primary source of feedback as the users of the latest Year 6 mathematics textbooks. Besides, to overcome the lack of teachers nationwide, mathematics teachers in Malaysia need professional qualifications in mathematics education. Hence, the academic qualifications of the

respondents are included in the study, too. Table 1 shows the demography of the respondents.

Table 1
Demography Of Respondents

Criterion	Options	n
Experience in teaching mathematics	1-5 years	45
	6-10 years	44
	10 years and above	11
Teaching Year 6 mathematics within the recent 2 years	Yes	31
	No	69
Mathematics majored	Yes	76
	No	24

Quantitative research usually requires extensive sampling to ensure data accuracy (Leavy & Patricia, 2017). Based on the random sampling strategy, 100 Chinese vernacular school mathematics teachers were involved in this research. This strategy is suitable because every teacher in this population has an equal opportunity to participate in this research (Gay et al., 2000). Table 2 summarizes the respondents' profiles based on their location. Fifty-seven town area mathematics teachers and 43 urban area mathematics teachers participated in the research.

Table 2
Respondents' Profiles Based On School Locations

	n			n	
District	Town	Urban	District	Town	Urban
Bau	4	4	Miri	4	3
Betong	0	3	Sarikei	0	2
Bintulu	2	0	Tatau/Sebauh	0	2
Samarahan	11	24	Serian	2	2
Kuching	22	0	Sibu	7	2
Lundu	3	0	Sri Aman	2	0

The research used an adapted instrument by the framework analysis in Huang et al.'s (2022) research and the principles and processes of Singaporean mathematics textbook publication in Fan (2010). The conceptual framework is a model that visually presents the relationships between the research variables (Creswell, 2012). Figure 1 shows the instrumental developmental framework of this research. The items of the research instrument are designed based on six aspects: curriculum, discipline, pedagogy, technology, context, and presentation. A Likert scale of 4 points was chosen for the evaluation because it does not involve the middle score, which does not give a clear opinion (Taherdoost, 2019). With that, the internal consistency and reliability of the instrument should be higher (Jebb et al., 2021).

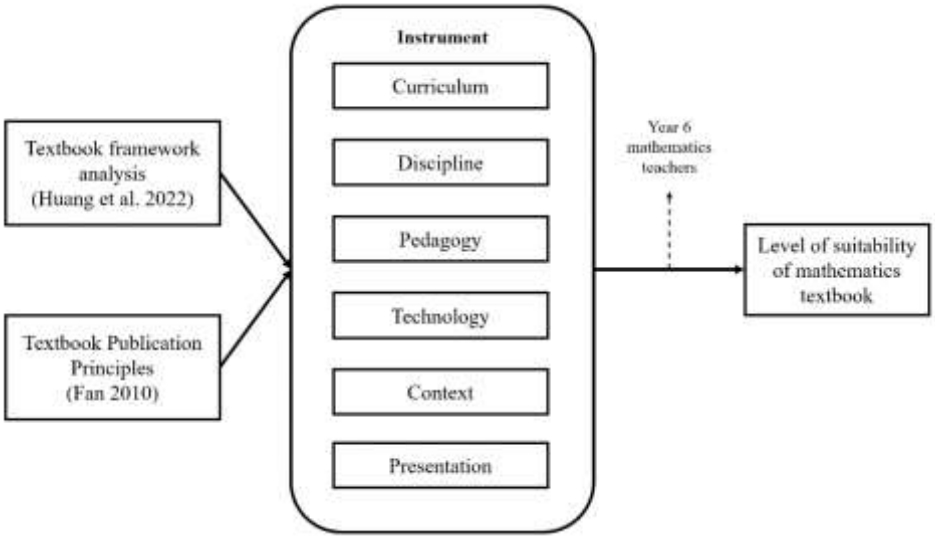

Figure 1 Research instrument developmental framework

The research was conducted in Malay to ensure the precision of message delivery. So, the researcher got advice and validation from two experienced language teachers and the researcher's supervisor after translating the instrument from the references. Both experienced teachers have more than ten years of experience in the Malay language and English language. Modifications were made based on their opinions. This process ensured that the language level throughout this instrument was comprehensible and accurately conveyed the message needed. The correction and modification were done and confirmed before the pilot test.

Cronbach Alpha is the internal consistency measurement that decides the reliability of an instrument (Bonett & Wright, 2015). Thirty primary school mathematics teachers in Samarahan district were involved in the pilot test. *Cronbach Alpha* proves the reliability of each item in the instrument. Table 3 shows the reliability index referred for the pilot test. The targeted level of reliability is high or above.

Table 3
Reliability index interpretation

Level of reliability	**Cronbach Alpha Value**
Very high	>0.90
High	0.07 - 0.89
Moderate	0.30 – 0.68
Low	0.30

Source: Sabilan et al. (2015)

After analysis, the value of Cronbach Alpha for the research instrument is at the highest level ($\propto = 0.89$). Hence, the instrument was distributed to the respondents in a Google form through Whatsapp. The respondents were informed about the purposes of the research and the criteria needed for respondents at the beginning of the research, together with the link to the Google form. A week later, the questionnaire stopped receiving responses, and the data collected was analyzed. Data analysis included only complete responses.

Descriptive and inference analyses answered all the research questions as discussed above. Collected data from the questionnaire was analyzed using the 27th version of the Statistical Package for Social Sciences (SPSS) application. The percentage of responses is categorized based on the agreement scale on each item to answer the first research objective. Then, the findings are presented in tables respectively. The research instrument used a 4-point Likert scale representing the teacher respondents' agreement level on each item. They are 1=Strongly Disagree (STS), 2=Disagree (TS), 3=Agree (S), and 4=Strongly Agree (SS). Table 5 shows the Likert scale interpretation according to the study by Pimentel (2019), which balanced the weight of each scale.

Table 5
Interpretation Of Scales Min Score

Scale	Min Score	Evaluation	Interpretation of Level of Suitability
4	3.28 – 4.00	Strongly Agree	Very High
3	2.52 – 3.27	Agree	High
2	1.76 – 2.51	Disagree	Low
1	1.00 - 1.75	Strongly Disagree	Very Low

Sources: Pimentel (2019)

The second research question is to study the correlation between each aspect of the level of suitability of Year 6 mathematics textbooks. First, the researcher carried out a normality test to determine the correlation analysis type. Later, the analysis product will shown in tables.

Research Findings

Mathematics teachers' perception towards the suitability of Year 6 Mathematics textbook from the aspect of curriculum, discipline, pedagogy, technology, context and presentation

The online questionnaire distributed to all mathematics teachers in Sarawak collected one hundred responses. Table 6 shows the distribution of responses on the first aspect of evaluation, the curriculum, based on percentage and min score on each item. From the curriculum aspect, respondents agreed that the level of Year 6 mathematics textbooks is suitable at the highest level, with a mean score equivalent to 3.52. K1 untuk K4 showed that the mean score was at the highest level of agreement, while only K5 rated at the high level. The majority of the teachers strongly agreed that the Year 6 mathematics textbooks were designed and aligned to the learning standard (79%), which led to the high accuracy of learning content (78%) and sufficient integration of thinking skills (50%). Whereas most teachers agree to the five proses of mathematics learning (58%) and that integrating attitude and moral values (78%) in the Year 6 mathematics textbook is sufficient.

Table 6
Curriculum Aspect In Year 6 Mathematics Textbooks

Code	Item	STS	TS	S	SS	M
K1	The Year 6 mathematics textbook is aligned with the learning standard.	0%	1%	20%	79%	3.78
K2	The learning content of the Year 6 mathematics textbook is accurate.	0%	1%	21%	78%	3.77
K3	Integrating six mathematical thinking skills in the Year 6 mathematics textbook is sufficient.	0%	1%	49%	50%	3.49
K4	The five mathematical learning processes integrated in the Year 6 mathematics textbook are sufficient.	0%	2%	58%	40%	3.38
K5	Integrating attitude and value in the Year 6 mathematics textbook is sufficient.	0%	1%	78%	21%	3.20

Table 7 shows the distribution of the mean score of the discipline aspect of the Year 6 mathematics textbook at the highest level, with a mean score of 3.32. The mean score for each item is between 3.10 and 3.45. All items in this section showed responses at the highest level of agreement. D7 about question inquiry skills (86%) and D6 about drilling on reasoning skills (82%) have the highest agreement rate among all. All the respondents agreed (70%) and highly agreed (30%) that the amount of conceptual knowledge drilling in the Year 6 mathematics textbook is sufficient.

Table 7
Discipline Aspect In Year 6 Mathematics Textbooks

Code	**Item**	**STS**	**TS**	**S**	**SS**	**M**
D1	The Year 6 mathematics textbook has a sufficient amount of examples given.	1%	2%	52%	44%	3.40
D2	The Year 6 mathematics textbook has sufficient operational and procedural practices.	0%	2%	51%	47%	3.45
D3	The Year 6 mathematics textbook has a sufficient amount of conceptual practice.	0%	0%	70%	30%	3.44
D4	The Year 6 mathematics textbook has sufficient graphic organizers (tables, graphics, maps, etc.) for skills practice.	0%	2%	52%	46%	3.40
D5	The Year 6 mathematics textbook has sufficient problem-solving practice.	0%	1%	58%	41%	3.30
D6	The Year 6 mathematics textbook has sufficient reasoning practice.	0%	1%	82%	17%	3.16
D7	The Year 6 mathematics textbook has sufficient problem-posing practice.	0%	2%	86%	12%	3.10

Table 8 shows that the mean scores for the pedagogy aspect in the Year 6 Mathematics textbooks are at the highest level (M = 3.32), with items P1 and P2 sharing the highest mean scores (M = 3.41) among all. All teachers, too, agreed that the evaluation in the Year 6 mathematics textbooks is sufficient. Only minorities disagreed with four pedagogical criteria in the Year 6 mathematics textbook, which are pedagogically orientated (1%), updated pedagogy (1%), integration of learning strategies (1%), and explicit learning objectives (2%)

Table 8
Pedagogy aspect in Year 6 mathematics textbooks

Code	Item	STS	TS	S	SS	M
P1	The Year 6 mathematics textbook is pedagogy-orientated.	0%	1%	57%	42%	3.41
P2	The Year 6 mathematics pedagogy is updated with the latest pedagogy.	0%	1%	57%	42%	3.41
P3	The Year 6 mathematics textbook integrated sufficient learning strategies (cooperative, collaborative, differentiation, etc.).	0%	1%	77%	22%	3.21
P4	The pedagogical instructions (Let's Recall, Let's Try) in the Year 6 mathematics textbook could become explicit learning objectives.	0%	2%	64%	34%	3.32
P5	The Year 6 mathematics textbook has sufficient evaluation.	0%	0%	73%	27%	3.27

Table 9 shows that the technology aspect in the Year 6 mathematics textbook has a high mean score ($M = 3.22$). Most teachers agreed to all the items in this aspect. However, the amount of teachers who disagreed with the items in the technology aspect is much higher than in previous aspects. 3% of teachers disagreed with the simplicity of tutorials of technology practice and the effectiveness of technology integration and technological references in the textbooks.

Table 9
Technology aspect in Year 6 mathematics textbook

Code	Item	STS	TS	S	SS	M
T1	Technology learning tutorials in the Year 6 mathematics textbook are easy to learn.	1%	2%	76%	21%	3.17
T2	Technology integration in the Year 6 mathematics textbook is easy to execute in schools.	0%	3%	77%	20%	3.17
T3	Technology integration in the Year 6 mathematics textbook supports learning.	0%	1%	82%	17%	3.16
T4	Technology-related references in the Year 6 mathematics textbooks are sufficient.	1%	1%	75%	23%	3.20
T5	The references (websites or QR codes) in the Year 6 mathematics textbook are helpful in pupils' understanding.	1%	2%	53%	44%	3.40

Table 10 shows that three out of five items in the context aspect have high mean scores ($M = 2.97$). Context is also the aspect with the most negative responses among all Year 6 mathematics suitability evaluation aspects. The highest positive responses on all the items in this aspect are at the agreed level. I3, about the historical application in the Year 6 mathematics textbook, has the highest disagree rating (29%). I2 (20%) about gender application comes next in the list, and then I1 (15%) is about cultural application. Only 1% of the teachers strongly disagreed with items I2 and I3.

Table 10
Context Aspect In Year 6 Mathematics Textbook (N = 100)

Code	Item	STS	TS	S	SS	M
I1	The cultural application (races, real-life scenarios, etc.) in the Year 6 mathematics textbook is suitable.	0%	15%	77%	8%	2.93
I2	The gender application in the Year 6 mathematics textbook is suitable.	0%	20%	73%	7%	2.87
I3	The historical application in the Year 6 mathematics textbook is helpful for understanding and learning.	1%	29%	65%	5%	2.74
I4	The language level in the Year 6 mathematics textbook is suitable for Year 6 pupils.	1%	2%	80%	17%	3.13
I5	The variety of perspectives (personal, second and third) in the Year 6 mathematics textbook helps understand the learning content.	0%	1%	78%	21%	3.20

Table 11 shows that the mean score for the presentation aspect in the Year 6 mathematics textbook is at the highest level ($M = 3.53$). Respondents did not rate negatively on items S1, S2, S3, S4, and S8, either disagree or strongly disagree. Besides item S9, which is related to the presentation of procedural steps, the rest of the items in this aspect have very high mean scores. S2 ($M = 3.85$) has the highest mean score. Only 1% of teachers disagreed with the five items: the suitability of the number of graphics, procedural presentation, and the arrangement of learning content.

Table 11
Presentation aspect in Year 6 mathematics textbook

Code	Item	STS	TS	S	SS	M
S1	Page numbers are clearly printed on Year 6 mathematics textbook page.	0%	0%	43%	57%	3.57
S2	Total page by topic in the Year 6 mathematics textbook is suitable.	0%	0%	42%	58%	3.58
S3	The size of the Year 6 mathematics textbook is suitable.	0%	0%	51%	49%	3.49
S4	The font of wording in the Year 6 mathematics textbook is suitable.	0%	0%	42%	58%	3.58
S5	The amount of graphics in the Year 6 mathematics textbook is suitable.	0%	1%	42%	57%	3.56
S6	The graphic in the Year 6 mathematics textbook aligns with the learning content.	0%	1%	43%	56%	3.55
S7	The graphics in the Year 6 mathematics textbook help pupils understand the learning content.	0%	1%	43%	56%	3.55
S8	The graphics in the Year 6 mathematics textbook stimulate pupils' thinking.	0%	0%	47%	53%	3.53
S9	The procedural presentation in the Year 6 mathematics textbook is suitable.	0%	1%	71%	28%	3.27
S10	The learning content organization in the Year 6 mathematics textbook is suitable.	0%	1%	38%	61%	3.60

Overall, all aspects in evaluating the suitability of the Year 6 mathematics textbook have the highest mean scores, except the context aspect, which only has a high mean score. Table 12 summarizes the descriptive analysis of the suitability level of the Year 6 mathematics textbook. The analysis shows that the respondents agree that the Year 6 mathematics textbooks currently used in the Chinese vernacular schools are suitable, but not at the best, with an overall mean score of 3.34 and the scale with the highest rating is Agree (59.57%).

Table 12
Overall Year 6 Mathematics Textbook Suitability Evaluation

	Scales					
Aspects	**STS**	**TS**	**S**	**SS**	**M**	**Level of Suitability**
Curriculum	0%	1%	45%	54%	3.52	Very high
Discipline	0%	1%	65%	34%	3.32	Very high
Pedagogy	0%	1%	66%	33%	3.32	Very high
Technology	1%	2%	73%	25%	3.22	High
Context	0%	13%	75%	12%	2.97	High
Presentation	0%	1%	46%	53%	3.53	Very high
Overall	0.16%	2.76%	59.57%	37.51%	3.34	Very high

Correlation between each aspect of the level of suitability of Year 6 mathematics textbook from the perception of mathematics teachers

Table 13 shows the reference of correlation interpretation used for this research. Based on the normality test, the Shapiro-Wilk statistic shows that all six aspects in the textbook suitability evaluation are significant ($W > 0.05$). The data distribution plotting also shows that all six aspects fulfilled the linearity and homoscedasticity assumption. Hence, the Pearson correlation analysis identified the strength of relationships between each aspect of the Year 6 mathematics textbook suitability evaluation.

Table 13
Correlation Strength Interpretation

Correlation Range	**Interpretation**
0.80 – 1.00	Very strong
0.60 – 0.80	Strong
0.40 – 0.60	Moderate
0.20 – 0.40	Weak
0.00 – 0.20	No relationship to very weak

Source: Salkind (2017)

Table 14 shows moderate and weak positive relationships between all the aspects of the Year 6 mathematics textbook suitability evaluation. Five out of six aspects have moderate positive relationships with the rest, including curriculum ($r = 0.408$), pedagogy ($r = 0.405$), and technology ($r = 0.459$). The discipline aspect only has a moderate positive relationship with the pedagogy ($r = 0.442$) and technology ($r = 0.525$) aspects. Besides, there are

moderate positive relationships between context and discipline ($r = 0.378$) aspects and presentation and discipline ($r = 0.335$) aspects.

Table 14
Correlation Analysis Between Six Aspects Of The Year 6 Mathematics Textbook Suitability Evaluation

Aspects	Curriculum	Discipline	Pedagogy	Technology	Context	Presentation
Curriculum	1					
Discipline	0.570 $(p < 0.001)$	1				
Pedagogy	0.517 $(p < 0.001)$	0.442 $(p < 0.001)$	1			
Technology	0.514 $(p < 0.001)$	0.525 $(p < 0.001)$	0.459 $(p < 0.001)$	1		
Context	0.408 $(p < 0.001)$	0.378 $(p < 0.001)$	0.405 $(p < 0.001)$	0.576 $(p < 0.001)$	1	
Presentation	0.502 $(p < 0.001)$	0.335 $(p < 0.001)$	0.452 $(p < 0.001)$	0.525 $(p < 0.001)$	0.427 $(p < 0.001)$	1

*Significance level at $\boldsymbol{p < 0.05}$.

Discussion

Textbooks play a vital role in the teaching and learning mathematics, especially for urban schools with difficulties getting an Internet connection. The textbook has become the primary reference for teaching and learning of mathematics. Hence, evaluating the suitability of mathematics textbooks from the perception of mathematics teachers provides empirical data for the education ministry, the designers of textbooks, and the educators. The data will help them select proper reference materials for more effective mathematics teaching and learning.

The research findings show quite a high agreement towards the suitability of the Year 6 mathematics textbook, which aligned with the current curriculum. This result is relieving because more than half of the respondents worked in the urban area schools in Sarawak. Considering these schools' lack of technology facilities, the negative responses, especially towards technology, are understandable. The descriptive analysis of the context aspect is consistent with the research finding where the sharing of historical mathematics learning information through applications or technology software by using laptops, watching videos online, or learning through barcodes has relatively higher disagreement from most respondents. The need for more Internet connections or technological applications discarded certain parts of mathematics learning (Julie & Maat, 2021). Based on the learning environment, mathematics teachers who depend on the mathematics textbook in planning their teaching have to adapt the learning content creatively (Afiqah et al., 2021) to ensure that learning quality is aligned with the curriculum.

According to Cheng dan Roslinda (2020), most practices in the Year 6 mathematics textbooks are under the knowing domain, the lowest thinking level, as stated in Bloom's Taxonomy. Their findings implied that the learning content in the Year 6 mathematics textbook should be comprehendible to the Year 6 pupils who have learned mathematics since Year 1. Most of the time, pupils only have to memorize facts and practice basic calculations. Cheng and Roslinda also found that the Year 6 mathematics textbook practices do not stimulate pupils' reasoning skills, causing a strong dependency on teachers' explanations during learning. Such dependency has reduced the importance of textbooks to pupils and limited the textbooks' usability to the teachers. This research supported the statement that most respondents needed to support the suitability level of the Year 6 mathematics textbook. Hence, the designers of the Year 6 mathematics textbook should reconsider learning content design.

Regarding meaningful mathematics learning, pupils should have authentic learning experiences (Ariffaturrahman et al., 2021). An authentic learning experience is achievable through the textbook's rich cultural application and integration. Technology literacy and cultural knowledge are equally significant, so their integration into the mathematics textbook should balanced. As for schools without technology facilities, teachers should creatively adapt the learning content that involves technology and cultural aspects according to the school localities. The adaptation of learning content is to prevent the pupils in the urban areas from being outdated. Adapting learning content considers the cultural aspect as suggested in the Culturally Responsive Theory for Inclusive Education (Corp, 2017; Hunter & Miller, 2022). Mathematics teachers should be creative in designing their teaching by applying various teaching strategies to create a learning environment closely related to the pupils' culture. Hence, mathematics textbooks should reduce examination-oriented design because teaching mathematics aims to prepare pupils capable of applying knowledge to solve real-life problems, not simply for excellent academic achievement.

Although Sarawak mathematics teachers agreed that the Year 6 mathematics textbooks are highly suitable for Chinese vernacular schools, the evaluation needs to be more comprehensive because it excludes inclusive aspects. Inclusiveness impacts evaluation aspects, such as learning pedagogy, context, and presentation (Aldahmash & Alamri, 2020). The moderate positive correlation between the Year 6 mathematics textbook suitability aspects shows the need to sharpen the instrument. Implementation of the Inclusive Education Program in all schools in Malaysia implies that mathematics textbooks should fulfill the learning needs of pupils with disabilities. Inclusive pedagogy integrated into mathematics textbooks will benefit all kinds of pupils, especially those slow learners in mathematics but not necessarily with disabilities. Hence, to improve the quality of research study on the usability and suitability of mathematics textbooks, the instrument must be upgraded by considering the inclusive criterion.

This research has used a random sampling technique on mathematics teachers in Sarawak. With that, the distribution of respondents is imbalanced (Gay et al., 2000). The imbalance of respondents' distribution affected the research findings when out of a hundred, fifty-seven teachers from urban areas agreed that the Year 6 mathematics textbook is suitable for their pupils. The agreement is at a lower level. A hundred respondents did not meet 10% of the mathematics teachers in Sarawak. Hence, the sampling bias is higher than purposive sampling. The study should be open to all mathematics teachers in the country to overcome the imbalance in the distribution of respondents instead of targeting a particular state or a

group of respondents by school localities. As a result, the validation and reliability of research data will increase.

Besides, the data quality depends on a set of questionnaires that needs to be improved to summarize the suitability level of particular mathematics textbooks. The researcher could not explain the items to the respondents because the data collection was online. With that, the optimum freedom to understand the items is given to the respondents, causing the interpretation of the instrument items to be subjective. The understanding of the items might differ from the researcher's initial intention. Spontaneous responses are also unavoidable and will definitely impact the research result. These are the risks to be responsible by the researcher for collecting data based on qualitative data. Hence, open-ended questions are suggested by requiring the respondents to write their opinions instead of rating them. Open-ended questions help the researchers explore further the reasons behind every response given by the respondents (Creswell, 2012). The responses to the open-ended questions will strengthen the research findings' reliability, providing a more comprehensive and solid summary of the research.

Conclusion

Mathematics textbooks have immense potential as teaching aids, but they require more attention to practicality and research. The insights gained from research could prove to be a valuable reference for the Ministry of Education and mathematics textbook designers. Therefore, it is essential that they consider these findings while redesigning more practical and user-friendly mathematics textbooks. Mathematics teachers are a crucial source of evaluation for the quality of a mathematics textbook, providing valuable feedback on its usability. By incorporating research findings, we can expect the quality of mathematics textbooks to improve with each new version, making them more user-friendly for all users, both nationally and globally. This research also serves as a reminder to the Ministry of Education about the need for a transparent design and publication protocol for mathematics textbooks. The more suitable the textbook is, the more significant it will be to its users. Consequently, mathematics teaching and learning will become more meaningful and effective.

References

Abdullah, M. H. L., & Hisham, S. (2019). *Technology-based intervention for children with learning difficulties*. https://www.researchgate.net/publication/333505379

Afiqah Azhar, N., & Rosli, R. (2021). *Analisis Kandungan Topik Tambah dan Tolak dalam Buku Teks Matematik Tahap 1 Sekolah Kebangsaan (Content Analysis of Addition and Subtraction Topics in Mathematics Textbook Year 1 of Sekolah Kebangsaan)* (Vol. 3, Issue 1). http://myjms.mohe.gov.my/index.php/jdpd

Aldahmash, A. H., & Alamri, N. M. (2020). An Analysis of the Inclusion of Mathematical Discourse Components in Arabic Mathematical Textbooks: The Case of Saudi Arabia. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.534803

Ariffaturrahman Zani, M. A., & Maat, S. M. (2021). Elemen Etnomatematik dalam Pengajaran dan Pembelajaran: Kajian Literatur Bersistematik. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *6*(10), 190–206.
https://doi.org/10.47405/mjssh.v6i10.1115

Boling, E., Eccarius, M., Smith, K., & Frick, T. (2004). Instructional Illustrations: Intended Meanings and Learner Interpretations. *Journal of Visual Literacy*, *24*(2), 185–204. https://doi.org/10.1080/23796529.2004.11674612

Bonett, D. G., & Wright, T. A. (2015). Cronbach's Alpha Reliability: Interval Estimation, Hypothesis Testing, and Sample Size Planning. *Journal of Organizational Behavior*, *36*(1), 3–15. https://doi.org/10.1002/job.1960

Cheng, J. W., & Rosli, R. B. (2020). Analisis Domain Kognitif bagi Latihan dalam Buku Teks Matematik Tahun 6. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *5*(11), 116–126. https://doi.org/10.47405/mjssh.v5i11.549

Corp, A. (2017). Using Culturally Responsive Stories in Mathematics: Responses From the Target Audience. *School Science and Mathematics*, *117*(7–8), 295–306. https://doi.org/10.1111/ssm.12247

Creswell, J. W. (2012). *Educational Research* (4th ed.). Pearson.

Dollah, M. U., Widjaja, W., Zabit, M. N. M., & Omar, T. Z. Z. (2019). A Comparison of Values of Progress Conveyed in Mathematics Textbook in Malaysia and Australia. *International Journal of Asian Social Science*, *9*(2), 179–188.
https://doi.org/10.18488/journal.1.2019.92.179.188

Fan, L. (2010). *Principles and Processes for Publishing Textbooks and Alignment with Standards: A Case in Singapore*.

Gay, L., Mills, G. E., & Airasian, P. (2000). *Educational Research* (10th ed.). Pearson Education.

Guan Yi, T., & Rosli, R. (2022). Analisis Kandungan Topik Ruang dalam Buku Teks Matematik KSSR Semakan 2021. *Jurnal Pendiidkan Sains Dan Matematik Malaysia*, *12*(2), 93–106. https://doi.org/10.37134/jpsmm.vol12.2.7.2022

Harris, J. B., & Hofer, M. J. (2011). Technological Pedagogical Content Knowledge (TPACK) in Action: A Descriptive Study of Secondary Teachers' Curriculum-Based, Technology-Related Instructional Planning. *JRTE*, *43*(3), 211–229. https://scholarworks.wm.edu/articles

Huang, R., Tlili, A., Zhang, X., Sun, T., Wang, J., Sharma, R. C., Affouneh, S., Salha, S., Altinay, F., Altinay, Z., Olivier, J., Jemni, M., Wang, Y., Zhao, J., & Burgos, D. (2022). A Comprehensive Framework for Comparing Textbooks: Insights from the Literature and Experts. *Sustainability (Switzerland)*, *14*(11). https://doi.org/10.3390/su14116940

Hunter, J., & Miller, J. (2022). Using a Culturally Responsive Approach to Develop Early Algebraic Reasoning with Young Diverse Learners. *International Journal of Science and Mathematics Education*, *20*(1), 111–131. https://doi.org/10.1007/s10763-020-10135-0

Jebb, A. T., Ng, V., & Tay, L. (2021). A Review of Key Likert Scale Development Advances: 1995–2019. In *Frontiers in Psychology* (Vol. 12). Frontiers Media S.A. https://doi.org/10.3389/fpsyg.2021.637547

Julie, L. J. H., & Maat, S. M. (2021). The Utilisation of Textbook in Teaching and Learning Mathematics Among Primary School Mathematics Teachers. *International Journal of Academic Research in Progressive Education and Development*, *10*(2).
https://doi.org/10.6007/ijarped/v10-i2/10174

Kapofu, L. K., & Kapofu, W. (2020). 'This Maths is better than that Maths' - Exploring Learner Perceptions on the Integration of History of Mathematics in Teaching the Theorem of Pythagoras: A Case Study. *International Electronic Journal of Mathematics Education*, *15*(3). https://doi.org/10.29333/iejme/8446

Kaur, B. (2021). A Look at Singapore Mathematics Education Through the PISA and TIMSS Lenses. In *Empowering Teaching and Learning through Policies and Practice: Singapore*

and International Perspectives (Vol. 1, pp. 61–73). Springer. https://doi.org/10.1007/978-981-16-1357-9_4

Leavy, & Patricia. (2017). *Research Design: Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-Based Participatory Research Approaches*. The Guilford Press.

Lepik, M., & Viholainen, A. (2015). Using Textbooks in the Mathematics Classroom-the Teachers' View. *Nordic Studies in Mathematics Education*, *20*(3–4), 129–156. https://www.researchgate.net/publication/286232223

Liang, S., Lyu, Y., & Zhi, Y. (2023). Comparison of the Content of Chinese and British Senior Secondary Mathematics Textbooks. *Proceedings of the 2022 International Conference on Science Education and Art Appreciation (SEAA 2022)*, 147–155. https://doi.org/10.2991/978-2-494069-05-3_19

Lindner, K. T., & Schwab, S. (2020). Differentiation and Individualisation in Inclusive Education: A Systematic review and narrative synthesis. *International Journal of Inclusive Education*. https://doi.org/10.1080/13603116.2020.1813450

Lv, J., Liu, K., & He, S. (2021). Differentiated Learning for Multi-modal Domain Adaptation. *Proceedings of the 29th ACM International Conference on Multimedia*, 1322–1330. https://doi.org/10.1145/3474085.3475660

Manopo, M., & Lisarani, V. (2021). Comparative Analysis of Non-Routine Problems in Mathematics Textbooks of Indonesia and Singapore. *Edumatika : Jurnal Riset Pendidikan Matematika*, *4*(1), 1–8. https://doi.org/10.32939/ejrpm.v4i1.750

Mersin, N., & Karabörk, M. A. (2021). The Comparison of Math Textbooks in Turkey and Singapore in Terms of Technology Integration. *International Journal of Curriculum and Instruction*, *13*(1), 552–573. https://www.researchgate.net/publication/348170235

Mersin, N., & Karabörk, M. A. (2022). Comparative Analysis of the History of Mathematics Content in the Secondary School Mathematics Textbooks of Turkey, Singapore, Ireland and Canada. *International Journal of Progressive Education*, *18*(4), 54–74. https://doi.org/10.29329/ijpe.2022.459.5

Nickl, M., Huber, S. A., Sommerhoff, D., Codreanu, E., Ufer, S., & Seidel, T. (2022). Video-based Simulations in Teacher Education: The Role of Learner Characteristics as Capacities for Positive Learning Experiences and High Performance. *International Journal of Educational Technology in Higher Education*, *19*(1). https://doi.org/10.1186/s41239-022-00351-9

Pimentel, J. L. (2019). Some Biases in Likert Scaling Usage and its Correction. *Article in International Journal of Sciences: Basic and Applied Research*. http://gssrr.org/index.php?journal=JournalOfBasicAndApplied

Ramelan, M., & Wijaya, A. (2019). A Comparative Analysis of Indonesian and Singaporean Mathematics Textbooks from the Perspective of Mathematical Creativity: A Case Statistics and Probability. *Journal of Physics: Conference Series*, *1320*(1). https://doi.org/10.1088/1742-6596/1320/1/012037

Rezat, S., Fan, L., & Pepin, B. (2021). Mathematics Textbooks and Curriculum Resources as Instruments for Change. *ZDM - Mathematics Education*, *53*(6), 1189–1206. https://doi.org/10.1007/s11858-021-01309-3

Sabilan, S., Fuad Ishak, M., Mohamed Lip, S., Nurzuliana Rashed, Z., Kusut, R., Hanini Sulaiman, S., Nga, S., & Mohni, ishah. (2015). Tahap Kesesuaian Matlamat dan Hasil Pembelajaran Kursus Praktikum (Latihan Mengajar) Kendalian Fakulti Pendidikan Kolej Universiti Islam Antarabangsa Selangor (KUIS) Menurut Persepsi Guru-Guru Pelatih: Satu Tinjauan Awal. In *Tinta Artikulasi Membina Ummah* (Vol. 1, Issue 1).

Salkind, N. J. (2017). *Statistics for People Who (Think They) Hate Statistics* (6th ed.). SAGE.

Singh, P., Yusoff, N. M., & Hoon, T. S. (2020). Content Analysis of Primary School Mathematics Textbooks and its Relationship with Pupils Achievement. *Asian Journal of University Education*, *16*(2), 15–25. https://doi.org/10.24191/AJUE.V16I2.10286

Taherdoost, H. (2019). What Is the Best Response Scale for Survey and Questionnaire Design; Review of Different Lengths of Rating Scale / Attitude Scale / Likert Scale. In *International Journal of Academic Research in Management (IJARM)* (Vol. 8, Issue 1). www.elvedit.com

Talib, C. A., Aliyu, F., Malik, A. M. B., & Siang, K. H. (2019). Enhancing Students' Reasoning Skills in Engineering and Technology through Game-Based Learning. *INTERNATIONAL JOURNAL OF EMERGING TECHNOLOGIES IN LEARNING*, *14*(24), 69–80. https://doi.org/10.3991/ijet.v14i24.12117

Tan, K. J., Ismail, Z., & Abidin, M. (2018). A Comparative Analysis on Cognitive Domain for the Malaysian primary Four Textbook Series. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(4), 1273–1286. https://doi.org/10.29333/ejmste/82625

Tomlison, C. A. (2014). *The Differentiated Classroom: Responding to the Needs of All Learners* (2nd ed.). www.ascd.org/deskcopy.

Toprak, Z., & Fatih Özmantar, M. (2022). A Comparative Study of Fifth-grade Mathematics Textbooks Used in Turkey and Singapore. In *ELECTRONIC JOURNAL FOR RESEARCH IN SCIENCE & MATHEMATICS EDUCATION* (Vol. 26, Issue 3).

van den Ham, A. K., & Heinze, A. (2018). Does the Textbook Matter? Longitudinal Effects of Textbook Choice on Primary School Students' Achievement in Mathematics. *Studies in Educational Evaluation*, *59*, 133–140. https://doi.org/10.1016/j.stueduc.2018.07.005

Vicente, S., Verschaffel, L., Sánchez, R., & Múñez, D. (2022). Arithmetic Word Problem Solving. Analysis of Singaporean and Spanish Textbooks. *Educational Studies in Mathematics*, *111*(3), 375–397. https://doi.org/10.1007/s10649-022-10169-x

Yang, D. C., Tseng, Y. K., & Wang, T. L. (2017). A Comparison of Geometry Problems in Middle-grade Mathematics Textbooks from Taiwan, Singapore, Finland, and the United States. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(7), 2841–2857. https://doi.org/10.12973/eurasia.2017.00721a