



A praxeological review of concept-sequence and series: Comparing Malaysia and Indonesia textbooks

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Abstract

Malaysia, through its curriculum, has implemented mathematics textbooks as the main source. However, not all concepts can be offered to a country. This research aims to analyse the comparison between Indonesian and Malaysian textbooks from a praxeological perspective. The data used is only on the topic of sequences and series. This qualitative research adopts a hermeneutic phenomenological approach, serving as an alternative method. In the context of the Indonesian version of didactic design, this study represents research conducted during the prospective stage of the entire research series. The results of the research show that in the praxis block, there are similarities in the presentation of Indonesian and Malaysian textbooks in introducing the topic of sequences and series. The difference is that in Indonesian mathematics textbooks there are 2 themes, while in Malaysia there is only 1 theme. The design in Malaysian textbooks is more in-depth and comprehensive, and the learning trajectory is arranged more systematically so that Malaysian textbooks allow for no gaps between the types of T used. The use of Malaysian textbooks has the potential to build complete knowledge, so the potential for students to have difficulties will be smaller.

Keywords: praxeology review; sequence and series; textbooks

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Introduction

The education system implemented in a country relies heavily on textbooks. Textbooks used by students can provide good learning opportunities (Baker, 2019; Kharisma, 2016; Pepin et al., 2013; Valverde et al., 2002) so the use of textbooks as teaching materials is very often found in the world of education (Can, 2021). Textbooks are the main curriculum source consisting of an organized set of units (Huang et al., 2022). The content presented in curricula or textbooks is the result of a didactic transposition (Chevallard, 1992; Chevallard & Bosch, 2020) which is influenced by the different cultures and histories in each country (Kang & Kilpatrick, 1992). In mathematics learning, several research results show that mathematics textbooks have a lot of influence on mathematics teaching and learning (Fan et al., 2013; Reys et al., 2004; Tarr et al., 2008) because the quality of mathematics textbooks can influence the way students learn mathematics (Fan, 2013; OECD, 2013; Stein et al., 2007). School textbooks also offer important resources that a mathematics teacher relies on and relies on in choosing the learning approach to be used (Beaton et al., 1996; Fan & Zhu, 2000; Sun et al., 2009). It is therefore important to analyze and compare textbooks between countries to understand the various education systems around the world (Huang et al., 2022). Several studies also show that textbook analysis can provide an important means of explaining differences in student achievement (Reys et al., 2004; Zhu & Fan, 2006) as well as can explain differences in student performance in international comparative studies (Fuson et al., 1988; Li, 2000).

Several researchers have analyzed and compared mathematics textbooks between countries, especially mathematics textbooks. Hendriyanto et al., (2023) have analyzed and compared textbooks used in Indonesia and Singapore on set materials. Another topic studied by Charalambous et al., (2010) was the material on adding and subtracting fractions in three countries, namely Cyprus, Ireland, and Taiwan. Yang et al., (2017) conducted another study, in which they examined geometry problems in middle-grade mathematics textbooks from Taiwan, Singapore, Finland, and the United States. Meanwhile, Mellor et al., (2018) compared how linear function material was presented in South African textbooks and German textbooks. Based on the example above, analyzing and comparing books has become a special concern among mathematics researchers. The topic in this research is so interesting that it makes researchers interested in studying it.

In this research, book analysis was carried out in two Southeast Asian countries, namely Indonesia and Malaysia. Indonesia and Malaysia have ethnic diversity so the implementation of the educational curriculum is adjusted to each ethnic group. Malaysia was chosen because previous research revealed that Indonesia and Malaysia have significant differences in student mathematics performance, for instance, assessments like the Trends in International Mathematics and Science Study (TIMSS) and the Program for International Student Assessment (PISA). (eg Mullis et al., 2000, 2008, 2012; OECD, 2010, 2014, 2016, 2019). Specifically, in the 2022 PISA results, Malaysia was ranked 53th, while Indonesia was only ranked 70th (OECD, 2023). Then, both countries are both located in Southeast Asia, so analyzing and comparing this textbook is apples to apples.

The mathematical topics that will be studied in this research are sequences and series. Initially, this topic was introduced at the elementary school level as number patterns, then continued to material on sequences and series at the middle school and high school levels (MoEC, 2018). This topic is important because it is often encountered in everyday life (Putri et al., 2023; Rachma & Rosjanuardi, 2021), such as sales, purchasing activities, and calculating the proceeds from the sale of goods (Putri et al., 2023). However, previous research reveals that students' abilities in this topic are still low (Maarif et al., 2021; Rachma & Rosjanuardi, 2021). For this reason, the results of this textbook analysis have the potential to provide a broader and deeper picture (Gracin, 2018). This analysis can be a starting point for designing textbooks in the future (Charalambous et al., 2010; Son & Senk, 2010; Yang & Lin, 2015), especially on sequences and series material.

This research needs to be equipped with theoretical and methodological reasons for analyzing mathematics textbooks. In this study, the Anthropological Theory of Didactic (ATD) was selected as the guiding theoretical and methodological framework. (Chevallard, 2006, 2019; Chevallard & Sensevy, 2014). Artigue and Bosh, (2014) define the Anthropological Theory of Didactic (ATD) as a theory for observing mathematical activities through epistemological models of mathematical knowledge. The ATD concept is to manipulate any material with didactic purposes (Juuti & Uitto, 2015). This research adopts praxeology as a contribution to the theoretical aspect (Chevallard et al., 2015) which is an important part of ATD. Using praxeological analysis, this research examines the presentation of the concept of sequences and series in mathematics textbooks in Indonesian and Malaysian textbooks.

In a previous textbook study, research by Siagian et al., (2023) only revealed the presentation of sequence and series material in Indonesian mathematics textbooks. In this research, we consider it necessary to analyze and compare Indonesian mathematics textbooks with other countries, in this case compared with Malaysia. This research offers a comparative analysis from a praxeological perspective and analyzes the differences between Indonesia and Malaysia to produce a general picture of the designs created. The research inquiry revolves around identifying the commonalities and distinctions between Indonesian and Malaysian textbooks concerning sequences and series. Essentially, this research involves a content analysis approach, utilizing a theoretical framework to comprehend the diverse content and educational levels represented in different systems. The ultimate aim is that the analyses and comparisons made within this study will contribute to the improvement of textbooks within the educational system.

Theoretical framework

ATD postulates that every activity related to the production, diffusion, or acquisition of knowledge must be interpreted as an ordinary human activity, and then proposes a general model of human activity built through the idea of praxeology (Bosch & Gascón, 2014). The similarities and differences between an educational system (called an institution) in ATD can be understood and characterized based on the conditions and limitations of the knowledge they use (Chevallard, 2006, 2019; Chevallard & Sensevy, 2014). In ATD, the didactic transposition

process is divided into 4 stages, namely: scholarly knowledge, knowledge to be taught, taught knowledge, and learned knowledge (Bosch & Gascón, 2006, 2014). Each didactic transposition process will involve a particular institution, such as a community of mathematicians, an education system, a mathematics class, or a study community.

The concept of praxeology is a tool offered by ATD (Bosch & Gascón, 2006, 2014; Chevallard et al., 2015). A praxeology comprises two integral components, specifically the praxis block and the logos block, with each of these blocks containing two individual elements, as illustrated in Table 1.

Table 1. Praxeological model of adaptation (Putra & Witri, 2017)

Praxis Practical Block	Type of Task(T)	Problems of given
	Technique(τ)	A way of performing the type of task
Logos Knowledge Block	Technology(θ)	A way of explaining and justifying (or designing) the technique
	Theory(θ)	To explain, justify, or generate, whatever part of the technology that my sound is unclear or missing

The praxeology model depicted in Table 1 shows that the knowledge and activities of a praxeology model are denoted as $(T, \tau, \theta, \Theta)$ (Chevallard et al., 2015), where (T) is the type of assignment given to students, (τ) is the technique used by students in solving problems, (θ) is the technology used, and (Θ) is the theory used to justify a technology. These four elements are interconnected $(T, \tau, \theta, \Theta)$.

In a class, assignments (T) can come from certain materials in books (Hendriyanto et al., 2023). So, students need techniques (τ) to complete assignments (τ) (Nazli Akar & Övez, 2018). In essence, a specific task (T) can be accomplished through the application of different techniques (τ) , and a technology (θ) can employ several types of techniques (τ) as described by Putra & Witri, (2017). The relationship between a particular task (T) and techniques (τ) used to carry it out is termed punctual organization. On the other hand, general technology supports various methods for a range of task types, and this is commonly referred to as local praxeology. However, because a theory (θ) is always used for several technologies, it is called a regional organization.

Praxeology serves not only as a tool for dissecting mathematical knowledge but also extends its utility to the examination of didactic knowledge. The nature of the didactic task (T) is connected to how the teacher instructs mathematics, such as how the teacher organizes situations in the classroom with the aim of so that students can understand several techniques (τ) for completing task (T) , for example, arithmetic and geometric series. Each teacher applies a variety of didactic techniques, for example, a didactic process that will be teacher- or student-centered. In reality, the technological theory block of a didactic praxeology is used to justify a technique used. These techniques vary greatly depending on knowledge and experience. This didactic praxeology organization is known as a didactic organization.

Methods

Research design

In this research, a qualitative methodology employing a hermeneutical phenomenological approach was utilized. This approach allows for the interpretation of meanings associated with the phenomenon under investigation. Hermeneutic phenomenology draws from both phenomenological and hermeneutic philosophies. Phenomenology's objective is to reveal the interplay between objectivity and subjectivity inherent in contemporary human experiences (Guillen, 2019). Hermeneutics, on the other hand, is employed to fathom the meaning of a particular situation or object from the perspectives of mathematicians, mathematics educators, and students (Keshavarz, 2020; Lavery, 2003). Hermeneutics also aids in clarifying behaviors, encompassing both spoken and unspoken expressions, cultural elements, and organizational systems, and reveals the meaning they contain, all while maintaining their interconnected relationships (Guillen, 2019). The integration of both phenomenology and hermeneutics complements each other effectively. Specifically, this research investigates the phenomenon of examining how the topic of sequences and series is presented in mathematics textbooks in two countries, Indonesia and Malaysia. Employing a hermeneutic phenomenological approach, this research holds significant relevance for scholars and professionals in the field of education (Friesen et al., 2012).

This praxeological research is situated within the Didactical Design Research (DDR) framework, which was introduced by Didi Suryadi in 2010 (Suryadi, 2019a). DDR serves as a research approach that can be applied to uncover specific phenomena. DDR functions are based on two fundamental paradigms: the interpretive and critical paradigms. The interpretive paradigm focuses on the analysis of real-world phenomena arising from the influence of didactic design on cognitive processes. In contrast, the critical paradigm is oriented toward effecting change by suggesting alternative solutions through hypothetical learning designs. The DDR framework, in its execution, consists of three distinct analytical stages: prospective, meta-pedagogical, and retrospective phases. These stages collectively facilitate a comprehensive investigation of didactical phenomena and the development of innovative educational solutions.

Praxeological research within DDR is situated within the prospective stage. This research is the initial research in a series of interconnected DDR research. In this study, investigators aim to scrutinize the emerging phenomena that underlie the development of hypothetical learning trajectories (HLT), derived from the didactic transposition analysis of sequence and series materials. The primary focus of this research is to explore the implications of employing textbooks in the didactic transposition process, particularly in Indonesian and Malaysian mathematics textbooks.

Selection textbooks for comparison

The textbooks chosen as the primary data for this study are those serving as the primary reference in schools in both Indonesia and Malaysia. Table 2 provides a presentation of mathematics textbooks from both countries.

Table 2. Selection of books from Indonesia and Malaysia

Country	Books used
Indonesia	Manullang, S., S, AK, Hutapea, TA, Sinaga, LP, Sinaga, B., S, MM, & Sinambela, PNJ (2017). <i>SMA/MA/SMK/MAK Class XI Mathematics Book</i> . Ministry of Education and Culture.
Malaysia	Bahariah, Baharizah, Jannah, N., Nurazreen, & Nazri, M. (2017). <i>Mathematics Level 2</i> . Ministry of Education Malaysia.

Mathematics textbooks from Indonesia refer to the revised edition for eleventh grade of SMA/MA students published by the Ministry of Education and Culture in 2017. This book is a representation of the implementation of revised K13 (Curriculum 2013), which develops 21st century abilities, including critical thinking and problem-solving abilities; communication and collaboration skills; as well as creativity and innovation (Trilling & Fadel, 2009). This book is a book that is used as the main reference in schools in Indonesia to increase the efficiency and effectiveness of learning in Indonesia (Kemdikbud, 2016).

According to a survey conducted by the Indonesian Ministry of Education and Culture, it is reported that textbooks issued by the Indonesian government are extensively utilized by mathematics teachers in Indonesia (Yang & Sianturi, 2017). Meanwhile, the Malaysian textbook used as a data source in this research is a level 2 mathematics book in the Standard Curriculum Secondary Curriculum issued by the Malaysian Ministry of Education in 2017. Both Indonesian and Malaysian textbooks are available online and can be accessed online free. In Indonesian mathematics textbooks, the topic studied in this research is named "*Barisan*". Meanwhile, in textbooks from Malaysia, it is given the name "*Pola and Jujukan*". Both countries place material at the secondary education level.

Data collection procedures

In line with the research objectives, the data utilized in this study pertains to document analysis. Document analysis is a method employed to explore various research aspects by examining written materials, notes, and documents. This approach is commonly employed in educational research, particularly when textbooks or curricula serve as the primary source of data. In this specific case, the documents being analyzed are secondary-level mathematics textbooks from Indonesia and Malaysia. The goal is to scrutinize the content and design within these documents, guided by a suitable conceptual framework.

Data analysis methods

The process of data analysis involves systematically exploring the meaning or significance of the collected information (Hatch, 2002). Cohen et al., (2007) revealed that qualitative data analysis includes the act of organizing, calculating, and explaining the data that has been collected. The analysis of data in qualitative research is an interconnected process, intricately linked with other stages in the progression of qualitative research, including data collection, exploration, and the writing phase (Creswell, 2015). The data analysis procedure in this research consists of 3 main phases, namely: the first phase, the design of arbitrary unit tasks in Indonesian and Malaysian textbooks is selected. Meanwhile, we include topics related to task design in the praxeology table. In the second phase, we created codes related to test design

independently. Coding is done sequentially. In the third phase, intercoder reliability is determined. In this phase, we will reconverge and analyze location inconsistencies in the taxonomy table. Inconsistent tasks will be coded by us for discussion in reaching an agreement. These three phases will take place cyclically and then, if necessary, will ask for advice from experts regarding the presentation of the textbook that has been prepared.

Results

This research uses two analyses, namely the praxis block and the logos block. BI and BM are the names for mathematics textbooks from Indonesia and Malaysia respectively. Before delving into the examination of variations between the praxis and logos components in BI and BM, we initiate the discussion with an introduction to each textbook. The visualization of each BI and BM can be presented in Figure 1 and Figure 2 below.

5.1 Menemukan Pola Barisan



Amati dan kritisi masalah nyata kehidupan yang dapat dipecahkan secara arif dan kreatif melalui proses matematisasi. Dalam proses pembelajaran barisan, berbagai konsep dan aturan matematika terkait barisan akan ditemukan melalui pemecahan masalah, melihat pola susunan bilangan, menemukan berbagai strategi sebagai alternatif pemecahan masalah.

Perhatikan ilustrasi berikut. Data uang saku seorang anak sekolah setiap hari adalah Rp10.000,00 dan untuk menumbuhkan niat menabung orang tuanya menambahkan sebesar Rp1.000,00 tiap harinya.

Jika uang saku tersebut disusun dengan bilangan-bilangan maka kita akan memperoleh susunan bilangan seperti berikut.

$$\begin{array}{ccccccc} 10.000, & 11.000, & 12.000, & 13.000, & \dots \\ \uparrow & \uparrow & \uparrow & & \\ +1000 & +1000 & +1000 & & \end{array}$$

Perhatikan bilangan tersebut mempunyai keteraturan dari urutan pertama, kedua, ketiga, keempat, dan seterusnya, yaitu bilangan berikutnya diperoleh dari bilangan sebelumnya ditambah 1.000. Bilangan-bilangan yang disusun berurut dengan aturan tertentu seperti itulah dikenal dengan nama *barisan bilangan*.

Figure 1. Introducing the concept of sequences in BI (Manullang et al., 2017)

1.2 Jujukan

1.2.1 Jujukan

Tujuan: Mengenal pasti pola dalam urutan nombor dan corak

Bahan: Lembaran kerja

Langkah:

- Buka fail MS007 yang telah disediakan.
- Lengkapkan jadual berikut dengan melukis corak seterusnya.

Perbincangan:

- Nyatakan pola yang anda dapati daripada aktiviti 1, 2 dan 3.
- Senaraikan urutan nombor dalam aktiviti 1, 2 dan 3.

Daripada aktiviti sebelumnya, susunan corak seterusnya boleh ditentukan dengan mengikut corak sebelumnya. Suatu susunan nombor atau objek yang mengikut pola ini disebut sebagai **jujukan**.

Jujukan ialah suatu set nombor atau objek yang disusun mengikut suatu pola.

Figure 2. Introducing the concept of sequences in BM (Bahariah et al., 2017)

In our opinion, the introduction of the sequence topic in BI uses a narrative illustration that is less relevant to everyday life, because the illustration may not occur in real life. The context of adding Rp. 1,000 in pocket money aims to interpret Rp. 1,000 as a difference from the previous day's money, but this could potentially cause epistemological obstacles because the construction of knowledge that students have to interpret a difference has been determined previously. The impact of this illustration also has the potential to make it difficult for students to determine the differences/patterns because students think the patterns/differences have been determined beforehand.

In contrast to BI, the topic of sequences in BM is introduced with an activity. This activity can form students' knowledge of line topics. The activities carried out also encourage students to be able to interpret differences that are not predetermined but represent an activity that has been previously designed. Activities at BM also integrate the topic of rows with the culture in Malaysia.

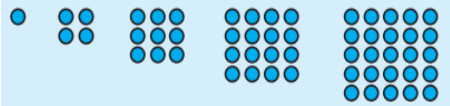
The differences in presenting marching topics become the style of each country. This is a technique for conveying knowledge from each country. In ATD, the knowledge conveyed to students has gone through 4 stages of didactic transposition, namely scholarly knowledge, knowledge to be taught, taught knowledge, and learned knowledge (Bosch & Gascón, 2006, 2014). BI can use the approach used in BM, thereby minimizing the epistemological barriers experienced by students.

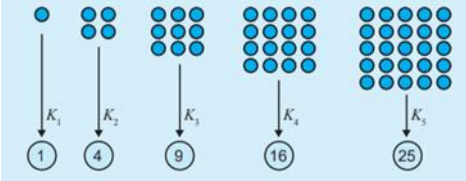

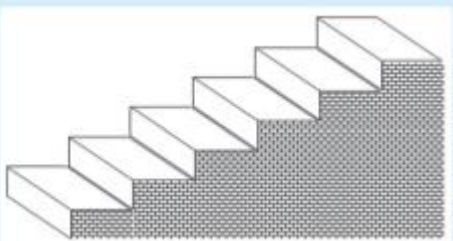
Praxis block analysis

The types of tasks presented in the textbook are part of the types of tasks (T) in the praxis block. Each textbook has a (T) different number, which in this study is denoted by $T_1, T_2, T_3, \dots, T_n$. The praxis block in BI on the topic of sequences and series is presented in 5 types of tasks (T_1, T_2, T_3, T_4, T_5) (see Table 3) while BM has 7 types of tasks ($T_1, T_2, T_3, T_4, T_5, T_6, T_7$) (see Table 4). Design BI tasks starting from T_1 using T_5 a contextual problem approach. T_1 and T_2 emphasize students to understand the concept of patterns. Meanwhile, T_3 and T_4 puts more emphasis on students understanding the theory of a sequence. In contrast to BI, the approach used by BM does not use contextual problems. BM uses a simple approach in designing pattern or sequence recognition. T_1, T_3, T_4, T_5 , and T_7 emphasizes fostering students' comprehension of the concept of patterns., while T_2 , and T_6 emphasizes students to understand the concept of sequences.

The tasks (T) in the textbook are completed using (τ) certain techniques. In a T particular case at least it can be solved using one technique (τ). This research uses a type of technique (τ) adopted by Takeuchi & Shinno, (2020) containing 4 types of techniques, namely perceptual (τ_1), physical (τ_2), operational (τ_3), and algebraic (τ_4). Perceptual (τ_1) refers to a way of solving Tusing visuals. Physical (τ_2) is a solution T carried out using several physical tools, such as a mirror, compass, ruler, and so on. Operational (τ_3) is a solution T that begins by directing students to develop the knowledge they have. Lastly, algebra (τ_4) is solving T using mathematical expressions.

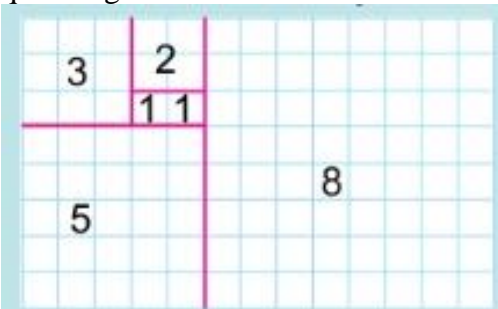
Table 3. Praxis block in BI

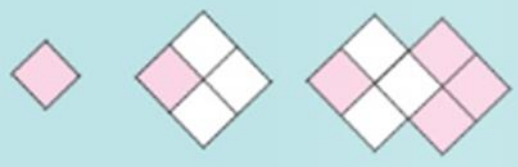
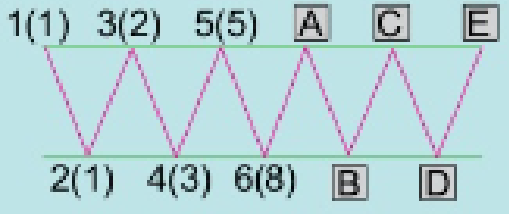
Type of Task(T)	Technique(τ)	Explanation of the methodology utilized in each textbook
<p>T_1:Several marbles are grouped and arranged so that each group is arranged in a square shape as follows.</p>	<p>τ_1, τ_3</p>	<p>Carry out mental actions to formulate appropriate visualizations and formulate ways to complete tasks using previously owned knowledge.</p>
<p></p> <p>The marbles are counted in each group and a sequence is obtained: 1, 4, 9, ...</p>		

Type of Task(T)	Technique(τ)	Explanation of the methodology utilized in each textbook
		
<p>Can you find the next number in the sequence? Can you find the sequence pattern? Determine the number of marbles in group 15?</p>		
	τ_1, τ_3	<p>Carry out mental actions to formulate appropriate visualizations and formulate ways to complete tasks using previously owned knowledge.</p>
<p>Picture. Pile of orange fruit T_2: the orange collision above. How to determine or estimate the number of oranges in one pile?</p>		
	τ_3, τ_4	<p>Considering the outcomes of perceptual and memory processes to execute mathematical expressions, with the goal of devising suitable problem-solving strategies and taking action to tackle sequence-related problems</p>
<p>Pay attention to the problem on the side! T_3: If the height of one step is 20 cm, what is the height of the ladder if there are 15 steps? Determine the sequence pattern!</p>		
<p>T_4: Lani, a batik craftsman in Gunung Kidul. He can finish 6 pieces of batik cloth measuring 2.4 m \times 1.5 m in 1 month. The demand for batik cloth continued to increase, so Lani had to provide 9 pieces of batik cloth in the second month, and 12 pieces in the third month. He suspects that the number of batik cloths for the next month will be 3 more than the</p>	τ_4	<p>Perform mathematical expressions to solve sequence applications</p>

Type of Task(<i>T</i>)	Technique(τ)	Explanation of the methodology utilized in each textbook
<p>previous month. With this work pattern, in what month did Lani finish 63 pieces of batik cloth?</p> <p>T_5: Every day Siti saves the rest of her pocket money. The money saved every day for six days follows an arithmetic sequence pattern with the first term $a= 500$ and the difference $b= 500$. How do you know how much money Siti saved on the 6th day?</p>	τ_4	Perform mathematical expressions to solve sequence applications

Table 4. Praxis Block in BM

Type of Task(<i>T</i>)	Technique(τ)	Explanation of the methodology utilized in each textbook
<p> 1×1 1 11×11 121 111×111 12321 1111×1111 1234321 11111×11111 123454321 </p> <p>T_1: Determine the value of the next two terms.</p>	τ_3	Complete tasks using previously held knowledge
<p>T_2: State the next two numbers.</p> <p>(i) 3, 8, 15, 24, 35, ... (ii) 7, 5, 8, 4, 9, 3, ... (iii) 2, 4, 5, 10, 12, 24, 27, ... (iv) 1, 4, 9, 18, 35, ...</p>	τ_3	Complete tasks using previously held knowledge
<p>T_3: How will you form the next Fibonacci quadrangle?</p> 	τ_1, τ_3	Carry out mental actions to formulate appropriate visualizations and formulate ways to complete tasks using previously owned knowledge.
<p>T_4: An interior decorator wants to arrange the tiles on the wall like the pattern below.</p>	τ_1, τ_3	Carry out mental actions to formulate appropriate visualizations and formulate

Type of Task(<i>T</i>)	Technique(τ)	Explanation of the methodology utilized in each textbook
 <p>What's the next pattern?</p>		ways to complete tasks using previously owned knowledge.
$2^2 + (2 + 2 + 1) = 3^2$ $3^2 + (3 + 3 + 1) = 4^2$ $4^2 + (4 + 4 + 1) = 5^2$ $5^2 + (5 + 5 + 1) = 6^2$ <p>T_5: (i) State the next two terms (ii) State the term n</p>	τ_3	Complete tasks using previously held knowledge
<p>T_6:What is the pattern for the following propositions?</p> <p>(i) 1, 4, 9, 18, 35 (ii) 23, 45, 89, 177 (iii) 5, 7, 12, 19, 31 (iv) 0, 4, 2, 6, 4, 8 (v) 4, 7, 15, 29, 59, 117</p>	τ_3	Complete tasks using previously held knowledge
 <p>T_7:State the corresponding pairs of numbers in positions A,B,C,D,E.</p>	τ_3	Completing tasks using previously owned knowledge 8

Overall, the practical blocks in BI start from T_1, T_2, T_3, T_4 , and T_5 are dominated by τ_3 and τ_4 . This indicates that the assignment design on the topic of sequences and series in BI requires students to develop the knowledge they already have and solve it with mathematical expressions. This condition means that students do not have the opportunity to construct their knowledge through observation (Hendriyanto et al., 2023). The learning process should be designed to facilitate the acquisition, processing and imitation of information as well as developing new ideas so as to increase student competence (Rashidov, 2020). Nonetheless, a significant number of Indonesian textbooks solely feature exercises that demand students to

discover solutions without the application of specific methodologies (Hidayah & Forgasz, 2020). In line with this, research by Fuadah et al., (2021) reveals that the problems in Indonesian textbooks are dominated by problems that only require procedural skills.

In BM, knowledge construction of sequences and series is built by carrying out a series of activities. The straightforward activities found in BM consist of organized and continuous learning pathways tailored to the referenced formulation (theory). The activities carried out at BM are representative of the integration of STEM with the education curriculum in Malaysia (Curriculum Development Center (CDC), 2016). This integration is adapted to the curriculum implemented by the Malaysian Ministry of Education, namely the Standard Secondary Curriculum (KSKM). In designing tasks from T_1 to T_7 , the techniques used in BM are dominated τ_3 by occasionally combined with τ_1 . This combination of τ_1 , and τ_3 cannot be separated from the task design which also accommodates students' perceptual abilities carried out through observation. The design T used in BM is quite simple but requires high cognitive abilities to complete it so that in a task T you can use several types τ . This is in line with the findings of Kul et al., (2018) when comparing textbooks from Turkey and Canada which revealed that the types of tasks given in the two textbooks tended to be more about learning in the cognitive domain. Differences in the presentation of books between countries can be interpreted as a hypothesis that can be formed regarding their effectiveness (Erbaş et al., 2012).

T_1 , and T_2 BI has similarities τ , namely τ_1 , and τ_3 to develop a theory (the concept of patterns and sequences) which is then refined in T_3 , T_4 , and T_5 through τ_3 and τ_4 . T_3 , T_4 , and T_5 puts more emphasis on students to use the understanding they have previously to express through mathematical expressions. The expected formulation of T_1 , and T_2 is θ_1 temporary T_3 , T_4 , and T_5 namely θ_2 . Student knowledge about this θ_1 can be a problem for some students because they are immediately given contextual problems without providing basic knowledge first. As a result, the goal θ_2 will not be achieved for some students because the students do not understand θ_1 it well due to differences in students' intelligence levels (Guez et al., 2018). This indicates that it T_1, T_2, T_3, T_4 , does T_5 not accommodate students' knowledge to apply and develop perceptual, memorial and introspective abilities in constructing new knowledge in θ_1 the world θ_2 . Therefore, the type T used in BI cannot yet form a τ systematic deep learning trajectory. There is a gap between T_1 to T_5 . The nature of justification in τ_1 , and τ_3 on T_1 , and T_2 does not consider students' previous learning experiences which allow for differences in knowledge possessed, students' way of thinking, and students' learning potential. Students' skills cannot be expected to excel if they have not practiced or have experience (Padilla, 1990). Apart from that, the new knowledge he obtains in the form of θ_1 not yet being able to verify the validity of the new knowledge he has in the form θ_2 of a true belief that the student discovered from his previous discoveries.

In BM, T_1 it T_7 has similarities, namely it always uses it τ_3 to introduce a theory (the concept of patterns and sequences). The main focus T in BM is how students get to know the concept of patterns and sequences through T very simple but in-depth types. The expected formulation of T_1 finite T_7 in BM is θ_1 . Apparently, there is no type T that requires students to

use mathematical expressions. Even though there are types T that use calculations, the type T that is built is how students can do it by building the concept first.

Logos praxis

In the logos block there are two components, namely the technology (θ) and theory blocks (Θ). Technology (θ) is used to justify a technique (τ), while theory (Θ) functions to generalize T , τ , and θ the entire process to produce theoretical knowledge.

In BI the formulations produced from several types T are θ_1 and θ_2 . θ_1 aims for students to understand the concept of patterns and sequences, while θ_2 it is a development θ_1 that aims to solve contextual problems using mathematical expressions based on previous knowledge. Usage of τ_1 , and τ_3 on T_1 , and T_2 and "How to determine or estimate the number of oranges in one pile?" This is possible because the construction of knowledge can be obtained by carrying out mental actions that connect the perception process and develop it. Meanwhile, τ_3 , and τ_4 to T_3 the extent that T_5 it is possible, but it is best to take into account θ_1 what the student has. The qualities θ_1 possessed by students will be the key to obtaining θ_2 .

Then, the formulation built on BM from T_1 to T_7 is θ_1 . The type T used focuses on how students understand the concept of patterns and sequences. In BM, everything T focuses on θ_1 construction but T also involves contextual knowledge to familiarize students with solving problems in everyday life. The problems used are quite simple, but still help students build the essence of θ_1 what is expected.

Discussion

Comparison of BI and BM

In the previous section, researchers have described the praxis block, namely technology (θ) & theory (Θ), and the logos block, namely tasks (T) & techniques, (τ) in each BI and BM book. The results of the analysis of two blocks based on two countries (Indonesia and Malaysia) concluded that the T new types could at least be classified into 2, namely: T_1 : recognizing pattern and sequence topics; and T_2 : solving contextual problems in pattern and sequence material. These two types T can be specifically divided into 2 major themes, namely: introducing the concept of patterns and sequences and solving contextual problems.

Table 5. Regional praxeology of sequence and series concepts in BI and BM

Theme	Country	Number T	Technique (τ)	Technology (θ)	Theory (Θ)
Recognize the topic of sequences and series	Indonesia	T_1, T_2	τ_1, τ_3	θ_1 : Numbers that are ordered according to certain rules are a number sequence	θ_1 : A sequence is a number or object arranged following a certain pattern
		T_1, T_2, T_5, T_7	τ_3		
	Malaysia	T_3, T_4	τ_1, τ_3		
	Indonesia	T_3 T_4, T_5	τ_3, τ_4 τ_4	θ_2 : application of patterns and	θ_2 : application of the

Theme	Country	Number T	Technique (τ)	Technology (θ)	Theory (θ)
Resolving contextual problems	Malaysia	-	-	sequences in everyday life	meaning of patterns and sequences

Table 5 displays the elements of praxeology used. There are two themes used, namely recognizing sequence and series topics and solving contextual problems. However, in BM there is only one theme used, namely recognizing the topic of rows and series. In BI, the presentation of themes recognizes the topic of sequences and series which are generally presented using τ_3 (operational) with 2 types T , namely T_1 , and T_2 also involving τ_1 (perceptual) which respectively refer to θ_1 , and θ_1 . Meanwhile, BM generally also uses τ_3 (operational) two types T , namely T_3 , and T_4 also involves τ_1 (perceptual), each of which also refers to θ_1 , and θ_1 . This is the similarity of Indonesian and Malaysian textbooks in introducing the concept of ranks and series to students.

The striking difference between the two books is that in BM the main focus is how to build theoretical knowledge to recognize the concepts of patterns and sequences. BM does not provide a type T that requires students to solve contextual problems that refer to θ_2 , and θ_2 use mathematical expressions. The knowledge built primarily introduces students to the topic of sequences. For example, look T_5 at Figure 3 below.

$$2^2 + (2 + 2 + 1) = 3^2$$

$$3^2 + (3 + 3 + 1) = 4^2$$

$$4^2 + (4 + 4 + 1) = 5^2$$

$$5^2 + (5 + 5 + 1) = 6^2$$

Figure 3. T_5 on BM

In Figure 3, students will carry out mental actions by looking at the regularity of the patterns presented. This is in accordance with the didactic situation theory where learning begins with an action situation (Suryadi, 2019). It seems simple, but the process of finding this regularity does not require mathematical expressions, so it helps students construct their knowledge.

In BI, apart from introducing the topic of patterns and sequences, the knowledge built also requires students to understand the theory they have studied to solve contextual problems. In general, τ what is used in this theme is τ_4 (algebra) which refers to θ_2 , and θ_2 . The key to success τ_4 is that students can understand θ_1 what they have previously learned well. For example, in the question "With this work pattern, in what month did Lani finish 63 pieces of batik cloth?" There are two things that students must have in solving this problem, namely: students must understand the problems presented in the story, and students must develop strategies to solve these problems. These two things have entered the action and formulation stage in *the Theory of Didactical Situations (TDS)* (Brousseau, 2002).

The types of tasks in BI range from T_3 to T_5 are tasks that fall into the *Higher Order Thinking Skills* (HOTS) category. This is because the textbooks in the 2013 curriculum are integrated into *Higher Order Thinking Skills* (HOTS) in the learning process (Pratama & Retnawati, 2018). The consequence that may arise is that students may not be able to do this type of assignment because the student's knowledge about it θ_1 is not yet able to support them in completing the assignment. This indicates that students have *learning obstacles* in sequence and series material. Researchers' findings show that many studies have revealed similar things (Hardiyanti, 2016; Maarif et al., 2021; Rachma & Rosjanuardi, 2021). The difficulties experienced by students are caused by errors in delivering the material, giving rise to misconceptions in acquiring knowledge (Tümay, 2016).

Conclusion

There are both similarities in the praxis block in Indonesian and Malaysian textbooks. T_1 and T_2 BI has similarities with T_3 , and T_4 BM. These types T both use τ_1 (perceptual) and τ_3 (operational) in introducing the topic of sequences and series. Other types T have differences in terms of theory (θ), and techniques (τ) used.

The differences that can be seen from BI and BM are that in BI there are two big themes that are used as objectives, namely recognizing the topic of rows and series; and resolve contextual problems. Meanwhile, in BM, only one theme is used as a goal, namely recognizing the topic of rows and series only. However, the design in BM is very profound because it is given a T simple type but the essence is θ_1 achieved. The learning trajectory built by BM is more systematic and it is possible that there are no gaps between the types T used. The learning design in BM also allows students to take action because in introducing the concept of rows a series of activities are carried out.

In BI, the design used requires students to think at a higher level. This design can provide the potential for students to experience learning difficulties due to errors in delivering the material. Type T_3 , T_4 , and T_5 in BI in general it aims to solve contextual problems. This could potentially cause students to have difficulties if θ_1 they are not yet able to construct new knowledge, namely formulation θ_2 . This is possible because each student has a different level of intelligence. In this way, it appears that the BI design is not too systematic to create a learning trajectory.

This research demonstrates that employing praxeological analysis contributes to elucidating the attributes of knowledge presented in textbooks. Characteristics of the knowledge presented in textbooks, we view textbooks as empirical knowledge that should be taught in the process of didactic transposition in ATD theory. The findings in this research can be used as a reference for educators, policy makers and related parties in considering use of textbooks in the classroom. It is hoped that these findings can become a reference for researchers in designing learning in the future by considering the advantages and disadvantages of each textbook.

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Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies, have been completed by the authors.

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Author Contributions

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