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Does opportunity to learn explain the math score gap between madrasah and non-madrasah students in Indonesia?

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ABSTRACT

The opportunity to learn (OTL) is one of the important aspects of achieving the goal of the learning process. There have been three dimensions of OTL: instructional time (IT), content covered during instruction (CC), and quality of instruction (QI) mentioned in the literature and used as a framework in this article. This study aims to reveal the gap in math ability between madrasah and non-madrasah students in Indonesia and the contribution of the three OTL aspects toward math scores. This study employed a cross-sectional survey approach with self-report instruments. The data were obtained from a survey of participants in the New Students National Selection for Madrasah Aliyah Negeri (Islamic High-school managed by the ministry of religious affairs) in 2021. There were 8,258 participants, consisting of 4,842 students from madrasah and 3,416 from non-madrasah. This study used multilevel structural equation modeling (SEM) to analyze the data. The findings show that (a) there is a gap in math ability score between madrasah and non-madrasah students which is -27, with a mean math ability score of madrasah students being lower than non- madrasah students, and (b) the time invested in learning significantly affects the occurrence of gaps in math ability scores, while the scope of the materials and the quality of learning do not affect the occurrence of the gap in math ability scores. These findings suggest that it is important for the Ministry of Religious Affairs to consider the addition of mathematical lesson duration in madrasah while restructuring the allocation for Islamic lessons.

Keywords: madrasah, math score, cross-sectional survey, OTL

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INTRODUCTION

One of the main issues in education that attracts the attention of researchers, both on a regional and international scale, is justice or equity (Gilleece et al., 2010; Mo et al., 2013; Shaeffer, 2019). In an educational context, equity has been defined from various perspectives. The concept of equity refers to an understanding that all students must have equal access to utilizing existing learning resources (Hwang et al., 2018; Yang Hansen & Strietholt, 2018). Equity is also viewed as providing equal learning opportunities for all students (Bulkley, 2013). As a result, students with various family backgrounds or socioeconomic statuses (SES) can optimally use their potential to gain maximum academic achievement. In addition, Salmi & Basset (2014) emphasize that equity is not only related to treatment for every child but also, even more importantly, to provide interventions that allow them to have equal opportunities for education.

Those definitions above highlight the need to provide equal opportunities for all children in education, regardless of their backgrounds. Equal opportunity is expected to reduce the gap of learning outcomes due to different backgrounds. Several studies have shown that the emergence of inequality has contributed to the quality of learning in schools (Aditomo, 2020; Brown et al., 2013; König et al., 2017). Research conducted by Heckman (2011), found that students with high SES learned math skills two years faster than students with low SES. Students with low SES tend to have lower mathematics learning outcomes than students with high SES groups (Kusaeri et al., 2018). This finding is in line with the PISA and TIMSS studies, which show inequality in learning outcomes among various groups of students: social class, gender, and education system (Hwang et al., 2018).

The disparity in accessing educational resources between these groups is the reason for the emergence of inequality of learning outcomes. Craw (2020), in his analysis, explained that countries with high-performance PISA average scores in mathematics tend to have high levels of equity. Under these conditions, the effect of SES on the PISA test results of the country's children is relatively insignificant. This finding confirms that if all children from different backgrounds get equitable access and quality education services, they have equal opportunities to excel (Vayssettes, 2020). Therefore, it is a must to increase equity in education.

Indonesia is one of the countries in Asia where the level of inequity in education is high (Wardhana et al., 2019). Indonesia's various topography from islands, mountains and rural forests are assumed to contribute to the high disparity among students (Wikaningtyas, 2017). Similar conditions also occur in China (Mo et al., 2013) and Korea (Viktoria & Eunah, 2022), which are influenced by the implementation of education decentralization. With the decentralization of education, local governments are obligated to pay all costs of basic education. In Indonesia's context, the disparity of economic growth among local governments results in inequality among areas specifically urban and rural areas. To conclude, the quality of education generally has increased, but not in certain areas, especially in eastern Indonesia and rural area (Kusaeri et al., 2018).

A report from World Bank (2016) shows that third-grade elementary school children in Western Indonesia (Java and Sumatra) can read 26 words per minute faster than children in East Indonesia (Nusa Tenggara, Maluku, or Papua). Similarly, children from urban areas can read 18 words faster than children from rural areas. This evidence shows that eastern and rural schools are lack of well-trained teachers or adequate facilities. The lack of trained teachers and learning support facilities causes students to have fewer opportunities to learn. In addition, the increasing number of good schools tends to cluster in western or urban areas of Indonesia and may cause Indonesia's level of inequality relatively higher than the neighbouring countries in ASEAN.

Another factor of inequality in education is the dualism of education management, which mostly non-madrasah, are under control of the Ministry of Education, Culture, Research and Technology while madrasah are under the management of the Ministry of Religious Affairs (Ashadi, 2022; Woodward, 2015). Non-madrasah are mostly managed by the state, while madrasah (more than 90%) are managed by the private institutions (Bazzi et al., 2020). As madrasah is managed by private institution, it often leaves many limitations, such as lack of funds, qualified teachers, and adequate learning facilities and infrastructure (Ali et al., 2011). Several studies report that there is inequality in mathematics learning outcomes between madrasah students compared to non-madrasah students. For example, a study by Kusaeri & Ridho (2019) reveals that madrasah students are far behind non-madrasah in achieving math scores in the National Examination (UN) for the last four years (2015-2018). OECD/Asian Development Bank (2015) also noted that the result of madrasah students in mathematic PISA test in 2012 were lower (score 357) than non-madrasah students (score 360). Similarly, Aditomo (2020) found that there was a mathematical literacy gap between madrasah and non-madrasah students. On the average, madrasah students' literacy scores were 116 points lower than that of public-school students. Based on the OECD reference standard, 116 points gap means madrasah students are about 4 years behind non-madrasah students.

Why does it happen? Here are some analyses that can be considered. First, madrasah students learn general sciences (e.g., mathematics, science, social studies and so on) and they also learn Islamic sciences (e.g., the Qur'an, *fiqh, aqidah akhlaq, tasawuf or tariqoh, nahwu, sorof* and *balagha*) (Lukens-Bull, 2010). With a lot of materials that they have to learn, undoubtedly, these students have fewer opportunities to study mathematics than non-madrasah students.

Second, the learning process in madrasah mostly use memorization including the contents of textbooks; this also influences the learning outcome (Berkey, 2010). In this kind of learning process, students are required to memorize all mathematics materials without considering whether the materials being memorized can be understood. This condition does not only occur in madrasah in Indonesia but also occurs in madrasah in other countries such as in the UK, South Asia, and other Southeast Asian countries (Asadullah & Chaudhury, 2016).

The various limitations in madrasah results in several implications such as the length of time allocated for learning in class, the scope of the materials, and the OTL materials. The concept of OTL refers to the opportunities provided by madrasah or non-madrasah for students to learn the subject. Various studies report that OTL is an important predictor of students' mathematics achievement (Bingolbali & Bingolbali, 2019). Students who have more OTL in learning mathematics will have higher mathematics learning achievement (Dumay & Dupriez, 2007).

However, OTL does not stand alone as it is influenced by many factors such as school and its facilities (Brown et al., 2013; Flores, 2007), math teacher’s knowledge (König et al., 2017; Schmidt et al., 2015), learning process (Blömeke et al., 2017; Qian & Youngs, 2016) or SES of the community (Aditomo, 2020; Mo et al., 2013; Yang Hansen & Strietholt, 2018). Based on the previous description of OTL, this study attempts to investigate the inequality in mathematic scores between madrasah and non-madrasah students in the National Selection of New Students (SNPDB) for Madrasah Aliyah Negeri IC (MAN-IC) of the Ministry of Religious Affairs, Indonesia.

Compared to the non-madrasah fellows, madrasah students have less interaction and learning process. This is considered as the potential cause of the above inequity. Bakar (2017) and Parker & Raihani (2011) state that with more subjects, students must learn more competencies from more courses. In addition, the comprehensive scope of the lessons with limited time allotment cause less in-depth delivery of the mathematics subject matter (Sayekti et al., 2022). In other words, madrasah students have less OTL for mathematics lessons compared to their non-madrasah colleagues.

This study used the OTL conceptual framework proposed by Elliott & Bartlett (2016) that consists of 3 dimensions: *instructional time* (IT), *content covered during instruction* (CC), and *quality of instruction* (QI). The first dimension relates to the duration of time devoted by students during mathematics learning, i.e., how students are actively involved and engaged in the mathematics learning process in order to achieve the expected learning outcomes. The second dimension refers to the materials taught during classroom learning, including the tasks that students must complete. The third-dimension deals with the actual quality of learning, i.e. how the learning process or interaction can occur between teacher-students, students, and students-learning resources.

These three OTL dimensions have been partially explored and studied. A study conducted by Hansen & Strietholt (2018) focused on the second dimension, namely, how often students get algebra and geometry problems during class learning. Mo et al. (2013), based on 2003 TIMSS data, explored the dimensions of materials coverage and teacher quality (certified teachers). Wijaya (2017) and Wijaya et al. (2015) are more inclined to highlight the first and second dimensions of OTL, namely, the scope of curriculum content and OTL of students completing context-based math tasks. A number of studies described above indicate that it is necessary to conduct further research that seeks to capture the mathematical achievements of madrasah and non-madrasah students in Indonesia using Elliott & Bartlett's (2021) OTL dimensions simultaneously. This is a possible gap, and the present study is expected to shed lights on what kind of aspect that should be improved in Indonesia education system specifically in madrasah.

This study, therefore, attempts to examine the gap in the SNPDB mathematical ability scores between madrasah and non-madrasah students in Indonesia and the contribution of OTL dimensions, including IT, CC, and QI. In addition, the study explores the gap of mathematics achievement of students in Indonesia between madrasah and non-madrasah students. As a result, it can be used to evaluate the quality of learning in madrasah. The OTL concept can be used as an instrument to understand variations in academic achievement between educational institutions to guide improving the learning process and policies related to the curriculum.

METHOD

The present study employed a cross-sectional survey approach with self-report instruments in the form of questionnaire. The cross-sectional survey approach was selected as it is considered as the most relevant to the purpose of this study, exploring the contribution of the three OTL dimensions (IT, CC and QI) on the mathematics ability scores between madrasah and non-madrasah students. Self-report instruments were used to inquire about participants' experiences during learning at madrasah/non-madrasah.

National Selection of New Students for Madrasah Aliyah Negeri IC (SNPDB MAN-IC) is a national selection to enter leading madrasah in Indonesia. This selection was participated by madrasah students and non-madrasah students who are in class IX semester II with their average age is 15 years. The materials tested in the selection include potential learning tests, math skills, science, social humanities, English, Arabic, and Islam. With such a composition of test subjects, the fact shows that each year participants from non-madrasah dominate the score.

Informed by this empirical evidence, the current study employed SNPDB MAN-IC 2021 data from the Ministry of Religion Affairs, Indonesia. The recent data shed light on the intriguing phenomenon of non-madrasah students' domination in the admission test. Does the mathematics subtest make a significant contribution to this condition? By further exploring the SNPDB MAN-IC 2021 data, information related to scoring acquisition and mathematics learning in madrasah and non-madrasah can also be obtained. In addition to documenting participant answers, the SNPDB data also provide participant profiles and information on the learning process experienced by the participants at the madrasah and non-madrasah.

In the 2021/2022 academic year, 13,911 participants joined in the MAN-IC SNPDB. The data were obtained through a survey given to a sample of participants prior to the implementation of the selection process. Of these participants, 8,258 or 59% of the total were involved in the survey, consisting of 4,842 (58.63%) from madrasah and 3,416 (41.37%) from non-madrasah schools.

The instrument to collect the data of OTL was in the form of a questionnaire designed from three OTL dimensions proposed by Elliott & Bartlett (2016). IT dimension was measured through 4 items, which asked participants to report how many hours a week: (i) they study mathematics at madrasah/non-madrasah, (ii) they study mathematics at home, (iii) additional lesson are provided by madrasah/non-madrasah (outside of the regular schedule), and (iv) they follow tutoring (outside class hours) to further learn mathematics materials.

CC dimension was measured through 3 items, namely: (i) the frequency of the mathematics teacher giving assignments or homework, (ii) the frequency of the mathematics teacher providing feedback on assignments or homework, and (iii) whether the mathematics teacher's way of giving assignments or homework can improve students' understanding on mathematics. Participants' answers ranged from 0 ("never") to 4 ("often").

Furthermore, QI dimension was explored through 8 question items to reveal various learning activities carried out by mathematics teachers in the classroom, starting from passive activities during learning (e.g., listening to the teacher's explanation or taking notes and doing assignments from textbooks) to active activities carried out by students (e.g., conducting discussions and doing assignments in small groups or conveying arguments clearly and logically). In this case, participants were given 4 alternative choices ranging from "Never" (weighted 1) to "Every Learning" (weighted 4).

The mathematics scores were collected from the written tests in 3 different forms: multiple choice (9 items), complex multiple choice (3 items) and matchmaking (3 items). The developed multiple-choice form has 4 answer options with 1 correct answer, while the complex multiple-choice form is a question that has more than one correct answer to the question. The written test instrument was constructed with a focus on revealing students' problem solving, critical and mathematical reasoning abilities so that those who are later accepted into MAN IC have high problem solving and reasoning abilities. The results of the analysis showed that the 15 items developed had a proportion of correct answers (p, difficulty level) on average of 0.51 (minimum = 0.15, maximum = 0.96). This shows that overall, the test items are at a moderate level of difficulty. The discriminating power has a mean of 0.30 (minimum = 0.20, maximum = 0.40), and it can be said that the 15 items can be used to distinguish well between participants with high and low abilities. Furthermore, this is evidenced that the test instrument is valid for score interpretation. Thereby, the high math score from the test results reflects the high ability of the respective participant, while the low score reflects the low ability of the test-taker as well.

Descriptive statistical analysis (e.g., mean, SD, and percentage) combined with t-test and F-test was used to answer the first research question. Afterward, Multilevel structural equation modelling (SEM) by using M-Plus version 8 software started with testing a series of models was implemented to examine the effect of OTL on student scores. The steps are based on Schumacker and Lomax (2016) framework, namely: (1) model specifications; (2) model identification; (3) model estimation; (4) model test; and (5) model modification. The developed structural model (model specification) is based on literature review about the involved variables in the research. The model should be identified whether it has variant and covariant that are close to variant and covariant sample. Afterward, the parameter was measured based on the result of measurement data (model estimation). From the parameter of model estimation output, the data were compared with the model to find the match between the data and the model (model test). The data match index was used to modify the model by adding or subtracting the way among the variables.

FINDING AND DISCUSSION

Finding

The description of the characteristics of the participants based on the origin of the madrasah (public and private madrasah) and non-madrasah (public and private) is presented in Table 1. In addition to the mean and SD, Table 1 also provides information on *skewness* and *kurtosis* to see the normality of the data that become a requirement for the t-test. The data show that the value of *skewness* and *kurtosis* lies in the range of -2.58 to 2.58, that means the 2021 SNPDB data used are normally distributed (Hoyle, 1995).

Table 1. Characteristics of SNPDB 2021 participants in terms of madrasah background

No	Institution	N	Mean	SD	Min	Max	Skewness	Kurtosis	SE
1.	State Madrasah	3640	6.12	2.32	0	16	0.20	0.24	0.04
2.	Private Madrasah	1202	6.12	2.30	0	14	0.12	-0.10	0.07
	Total Madrasah	4842	6.12	2.32	0	16	0.18	0.16	0.03
3.	State Non- Madrasah	1190	6.44	2.39	0	16	0.29	0.35	0.07
4.	Private Non-Madrasah	2226	6.37	2.43	0	16	0.26	0.29	0.05
	Total Non-Madrasah	3416	6.39	2.42	0	16	0.27	0.31	0.04

Table 1 shows that the average of mathematical ability score of madrasah students is lower than that of non-madrasah students. The difference is -.27 with $t(8257) = -292.69$, $p < .001$, and shows a significant gap in math ability scores between student from madrasah and non-madrasah. To facilitate the data reading from Table 1, the following bar graph can be a reference (Figure 1).

Specifically, by considering the school status (public madrasah, private madrasah, public non-madrasah, and private non-madrasah) F value is $(3.8254) = 9.146$ with $p < .01$. This result emphasizes the existence of a significant gap in the mean score of mathematics ability between students from public madrasah, private madrasah, public and private non-madrasah. Furthermore, the post hoc analysis (Table 2) shows a significant difference between madrasah (both public and private) and public school (see p value in column 6 which is less than 0.5). In Table 2, participants from madrasah ranks lower in their mathematical abilities than non- madrasah (because the differences in column 4 are all negative in Groups 1, 2, 4 and 5).

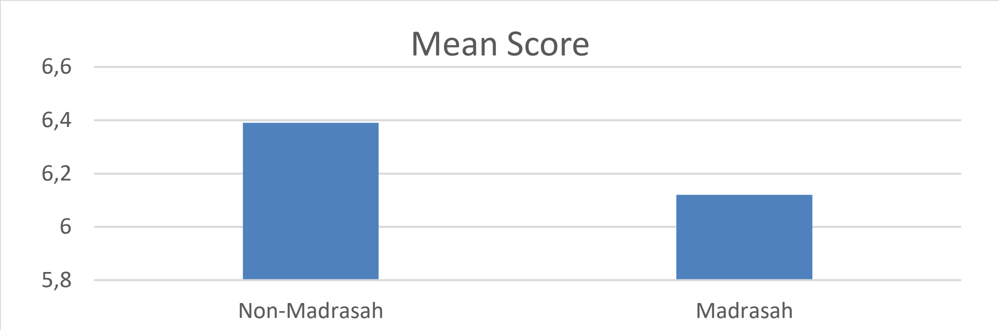

Figure 1. Differences in the Mean Score of Mathematics Ability between Madrasah and Non-Madrasah Students

Table 2. Differences in the mean score of mathematics ability between groups

Group	Group 1	Group 2	Difference	SE	*p*	Lower	Upper
1.	State Madrasah	State Non- Madrasah	-0.32	0.08	0.00	-0.53	-0.11
2.	State Madrasah	Private Non-Madrasah	-0.25	0.06	0.00	-0.41	-0.08
3.	State Madrasah	Private Madrasah	0.00	0.08	1.00	-0.20	0.21
4.	Private Madrasah	State Non-Madrasah	-0.32	0.10	0.00	-0.58	-0.07
5.	Private Madrasah	Private Non-Madrasah	-0.25	0.08	0.02	-0.47	-0.03
6.	State Non-Madrasah	Private Non-Madrasah	0.07	0.08	1.00	-0.15	0.30

Several analyses can be raised to address this fact. The most rational and most prominent analysis is that state non-madrasah have adequate funding and control over the teaching and learning process. In addition, student input that is better than private non-madrasah is often the concern of experts to justify it. Finally, most madrasah are affiliated to certain *pesantren* (traditional Islamic seminary) or are managed by its alumni. This has at least an impact on the following two consequences.

First, the allocation of lesson hours prioritizes Islamic lessons over general lessons. This condition gives them less maximum influence in learning mathematics and science. Second, the learning process in madrasas also encourages students to remember and memorize the contents of textbooks, as in Islamic boarding schools. This method is certainly less effective in developing students' readiness to master mathematics and science lessons.

The various assumptions above are subject to be tested because the other variables that influence it are certainly still quite a lot and complex. By looking at the other side and the variables that have not been explored much, it is expected that the pattern of finding solutions in overcoming the gaps that occur in madrasah and non-madrasah can be carried out appropriately. One of them is by looking at the OTL side that occurs in the two types of educational institutions. As previously described, OTL in the context of this research includes three dimensions: IT, CC and QI. The three OTL dimensions are described as variables that affect mathematical ability. Furthermore, the structural equation model that relates the four variables is described in model 1 (Figure 2).

The next step is to modify the model by eliminating the factor load, which is less than .20, and in this case, it becomes model 2 (Figure 3). This condition occurs in indicators that measure the set and probability. The factor load on the two indicators is .00 for the set, and .11 for the probability, as shown in Figure 2. The elimination of a factor load less than .20 is based on the item having low discriminating power. Model 2 shows that IT is proven to have a significant ($p < .001$) positive impact on mathematical ability. Meanwhile, CC and QI ($p > .05$) were not shown to have an impact on mathematical ability. The absence of the contribution of CC and QI to the gap in math ability scores will be explained further after Figure 4.

In the last stage, a model fit test was conducted. Table 3 presents the model fit criteria by taking into account log likelihood (LL) values, Akaike information criteria (AIC), Bayesian information criteria (BIC), comparative fit index (CFI), Tucker Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean -square residual (SRMR).

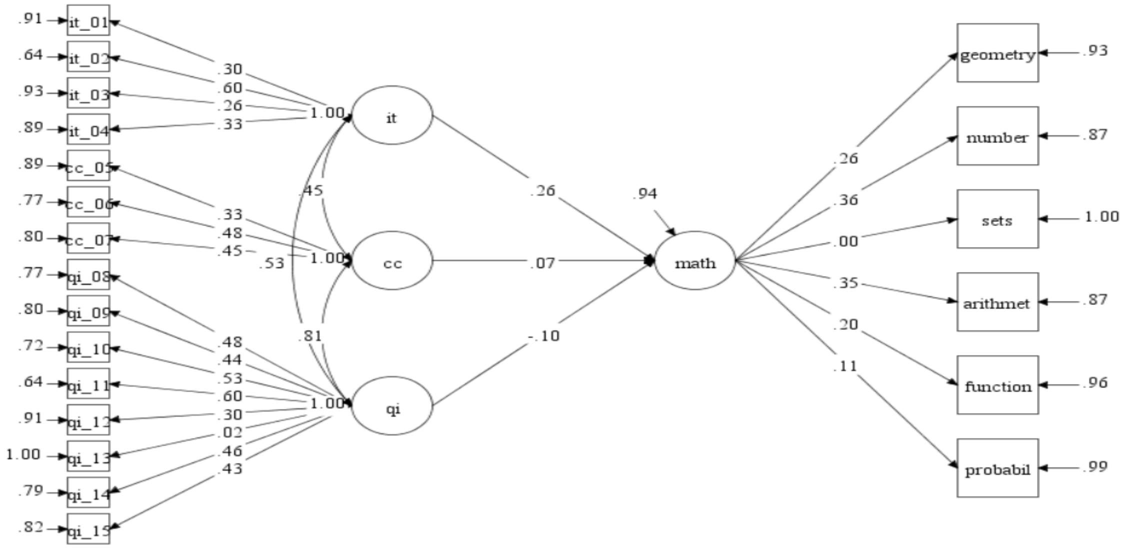

Figure 2. Relationship between IT, CC, and QI with Mathematical Ability (MATH) as 1st Models

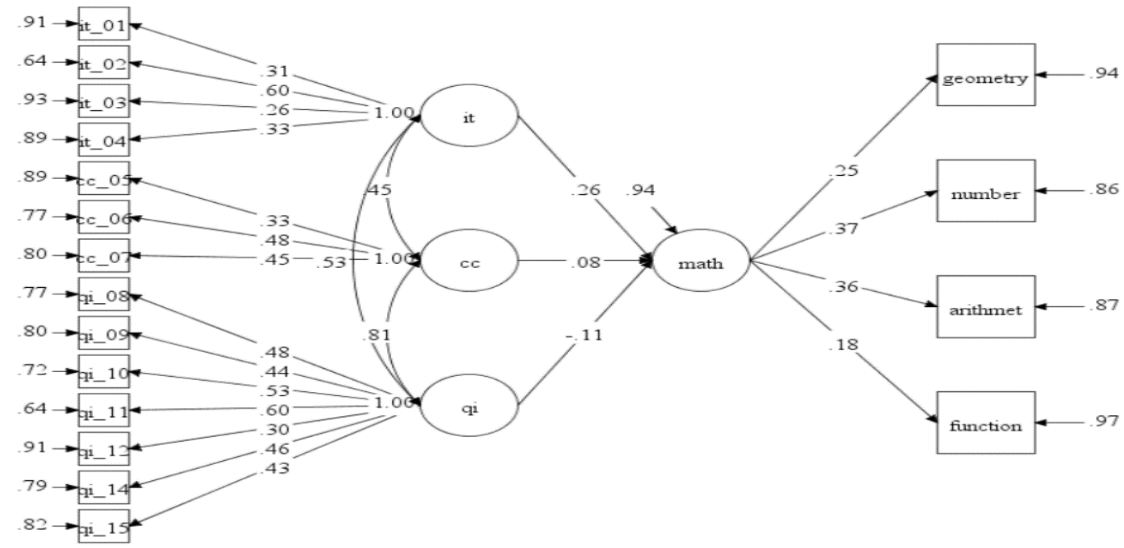

Figure 3. Relationship between IT, CC, and QI with Modified Mathematical Ability Refers to a Loading Factor of More than 2 (2nd Models)

Referring to Schumacker and Lomax (2016) the suitability of the model with the data can be evaluated with the following criteria: for LL, AIC, the smaller the BIC means the more fit; while CFI > .95, TLI > .95, RMSEA < 0.08, SRMR < .05 indicate good fit data. Based on these criteria, it can be concluded that Model 3 has the best fit compared to Model 1 and Model 2.

Based on the information from Table 3, Model 2 is modified to Model 3 which is proven to have the best fit. In this model, all IT indicators have a significant factor load. Meanwhile, significant indicators of mathematical ability are geometry, numbers, arithmetic, and functions. Furthermore, the effect (standardized) of IT on mathematical ability in model 3 is .22, indicating the contribution of "medium" level of IT to mathematical ability.

Table 3. Comparison of data fit with model 1, model 2, and model 3

Models	Pars	LL	AIC	BIC	CFI	TLI	RMSEA	SRMR
Model 3	22	-73240.06	146.524.111	146678.53	0.995	0.991	0.007	0.008
Model 2	57	-160653.69	321.421.375	321821.45	0.877	0.852	0.038	0.028
Model 1	69	-191484.38	383.106.756	383591.06	0.789	0.758	0.041	0.034
Best Fit		Model 3	Model 3	Model 3	Model 3	Model 3	Model 3	Model 3

Notes. Pars = number of estimated parameters

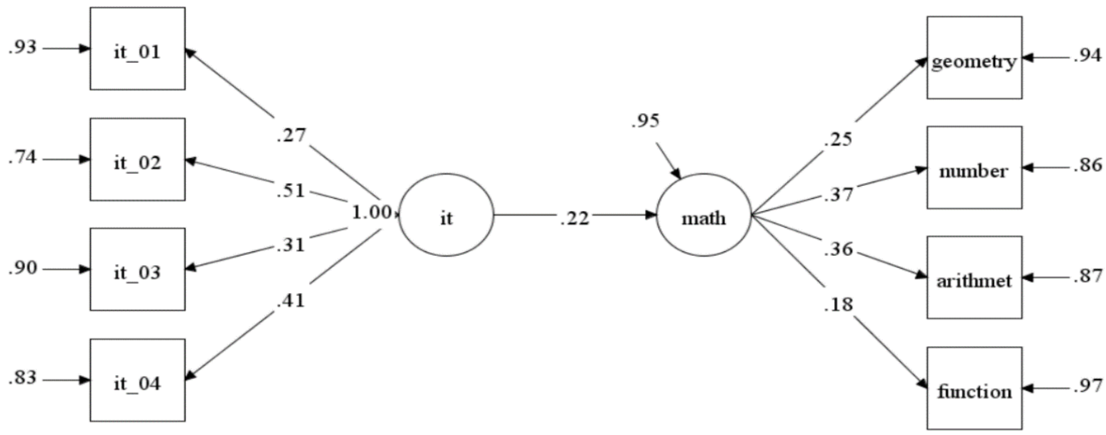

Figure 3. The Best Representation of the Relationship between IT and Mathematical Ability (3rd Models)

The occurrence of gaps in math skills scores between madrasah and non-madrasah participants in the IT aspect can be traced to the causes of each indicator. The indicator “Average time you spend studying math at home” (it_02) has the strongest loading factor (.51) in constructing IT latent variables. The research data shows that the average length of time used by madrasah students to learn mathematics at home is shorter, namely 2.30 hours/week compared to non-madrasah students with 2.49 hours/week.

In general, the "time" experienced by madrasah students to stay in touch with mathematics is relatively less than that of non-madrasah students. The research data shows that the average time allocated by madrasas for mathematics lessons in class (it_01) is 3.93 hours/week, while non-madrasah is 3.99 hours/week. On the other hand, the additional hours allocated by madrasahs (outside class hours) for mathematics lessons (it_03) are 0.54 hours/week, whereas non-madrasah students are 0.59 hours/week and the average participation of madrasah students in tutoring (it_04) is 0.75 hours /week, less than non-madrasah students 0.95 hours/week.

Meanwhile, CC and QI in the aspect of CC which was explored through 3 questions, balanced results were obtained between participants from madrasah and non-madrasah. For example, the frequency of teachers giving assignments or homework, as many as 34.41% of Madrasah participants answered 'Yes' while non-madrasah participants were 34.04%. In terms of providing feedback on assignments or homework, as many as 52.62% of madrasah participants admitted, "Yes, it is done every meeting," whereas 54.65% of non-madrasah participants also admitted the same thing. The interesting way mathematics teachers gave assignments or homework was responded almost the same by the two groups of participants. A total of 63.59% of madrasah admitted that it was interesting, while 63.08% of non-madrasah participants responded the same way.

Discussion

Overall, the mathematics ability scores of non-madrasah participants (both public and private) in this study were better than those of madrasah participants. These results are consistent with previous studies. For example, research conducted Ali & Furqon (2016) with a mathematical instrument adapted from TIMSS 2015 shows that the ability of madrasah students is lower than non-madrasah students on 9 of the 11 items tested (geometry and measurement material as well as data and uncertainty material). Meanwhile, on the other 2 items (focusing on testing numbers and algebra), madrasah students' abilities were superior to non-madrasah students.

This condition also happens in other countries. Asadullah (2016), in his study of madrasah in Bangladesh, found a difference in mathematical ability scores between madrasah and non-madrasah students, with the average score of non-madrasah students being superior. However, madrasah students have more advantages in religious lessons. Kusaeri & Ridho (2019) study with the 2015 - 2018 national exam results database in mathematics informs slightly different findings. Madrasah students' mathematical ability scores tended to fall in the 4-year span, while non-madrasah students consistently tended to be stable and had better results than madrasah students.

Several explanations and further analysis as the trigger for the above conditions can be stated as follows. First, most madrasah teachers (especially private madrasah) come from Islamic colleges (PTKIN or PTKIS) and Islamic study programs such as the Islamic Education Study Program (PAI). In madrasah, they teach general subjects such as mathematics or science. As a result, teachers work not in accordance with the required educational qualifications or mismatch (Yahya, 2015) and employability issues in Indonesia (Ashadi, 2022). The learning process carried out tends to encourage students to remember and memorize the textbook's contents (Ahid, 2010; Asadullah & Chaudhury, 2016). Teachers who only focus on encouraging students to memorize materials are not effective enough in developing students' readiness to master math and science lessons (Putra & Kumano, 2018).

Second, in addition to studying general sciences, madrasah students are also required to study Islamic sciences which becomes its distinctive feature, such as the Qur'an, *fiqh, aqidah akhlaq, tasawuf or tariqoh, nahwu, sorof and balagha* (Lukens-Bull, 2010). The number of subjects taken by madrasah students compared to non-madrasah students, meanwhile the time allocation is inadequate or the students are even overloaded with too many subjects, making the mastery of madrasah students to all subjects is not fully accomplished (Yahya, 2015). On the other hand, madrasah students, generally, according to Akhwan (2008) still prioritize religious lessons over general subjects such as mathematics and science. This condition influences students’ attempts for optimal efforts in learning mathematics and science.

Third, the consequence of having too many subjects, madrasah students tend to have shorter time allocated to learn mathematics in class or to provide additional hours. Under these conditions, it is difficult for madrasah policy makers to allocate additional hours beyond the demands of the curriculum (Yusuf et al., 2021). Meanwhile, non-madrasah with fewer subjects can flexibly provide additional time allotment for more learning opportunities. A recent study by Muttaqin et al. (2020) shows that the investment of time used for learning has a very strong correlation to student performance. The longer time allocated for learning will increase student performance (Stinebrickner & Stinebrickner, 2008), especially for math and science lessons (Grave, 2011).

On the other hand, the results demonstrate that IT dimension is proven to have a significant contribution to mathematical ability, while CC dimension and QI dimension have no contribution to students' mathematical abilities. Regarding the IT dimension, the previous section shows that the length of time students spend in learning mathematics has a strong relationship with students' ability in mathematics (Grave, 2011; Stinebrickner & Stinebrickner, 2008). Therefore, this discussion is more focused on aspects of CC and QI that do not contribute to math ability scores.

On the CC dimension, the switch from face to face classroom to online learning due to Covid-19 has significant effect (Haryati et al., 2021). Based on the evaluation from Ministry of Education, Culture, Research and Technology, after one year of online learning, various aspects are decreasing of both teaching learning process and outcome such as student score, material and learning effectiveness (Mustafa et al., 2021). In short, online learning has limitation either in term of teacher or students that results in the lack of students’ CC. Why does it happen?

The learning conditions of online during the Covid-19 pandemic have an extraordinary effect and shock for all parties, especially teachers and students, both madrasah and non-madrasah teachers. Adjustments are needed both from the student and teacher side in terms of giving math assignments, doing assignments given by the teacher, and how to provide feedback on assignments or homework. Previous studies (Asdar, 2020; Divayana, 2017) found that the obstacles in online learning include students and teachers being not familiar with online learning, limited support facilities for online learning and the not-optimal socialization of the learning modes.

From the teacher's point of view, the above phenomenon indicates the occurrence of surprise at the change in learning patterns, from face to face to online. Andriyani et al. (2021) and Lloyd et al. (2012) argue that the ability to use learning technology is still a challenge for teachers in these conditions. In particular, teachers who have initial experience in online learning will usually face more obstacles than teachers who have previous experience. Thus, the ability of teachers to use online learning media that can deliver assignments or homework well and provide feedback quickly becomes a necessity. Providing fast and precise feedback is, therefore, a necessity (Schulze, 2016).

From the student's perspective, when the learning system is carried out face-to-face, assignments and homework are delivered directly by the teachers with their psychological interactions. However, when the learning system changes to online, delivering assignments and feedback is still a challenge (Chakraborty & Muyia Nafukho, 2014). Students are also often unable to submit assignments on time due to various reasons such as internet problems. They also feel bored because they feel that every day, they only dwell on various tasks. Another obstacle is the unclear explanation of the teacher in the teaching and learning caused by poor internet connection so that the materials presented, assignments, and homework given are not clear. Moreover, as mathematics lessons are abstract in nature, teacher explanations conducted virtually have many limitations and often still cause difficulties among students. These obstacles that occurred during the beginning of the pandemic were deeply felt by students and were finally reflected in this survey.

The portrait above also represents why the QI aspect has no contribution to the math ability gap score between participants from madrasah and non-madrasah. Aspects explored to obtain information on the quality of learning at both institutions such as learning activities that encourage students to think and construct mathematical concepts (e.g., conducting discussions and doing assignments in small groups, conveying arguments clearly and logically from the given mathematical problems, and discussing various ways to solve mathematical problems) cannot be portrayed properly. This occurs because the ability of teachers to facilitate interactions in the online learning environment that encourages and can record all these activities during this year has not been optimal. In fact, the role and competence of new teachers are indispensable (Diningrat et al., 2020). Without this ability, teachers in teaching during this pandemic tend to have difficulties (Garad et al., 2021). The forms of online learning for almost two years enacted in Indonesian schools, including both *madrasah* and non-*madrasah*, are suspected of having contributed to the findings of this study. Therefore, further research on OTL in other subjects as well as research on OTL post pandemic is urgently needed in the future.

CONCLUSION

From the above explanation, there are some crucial findings from this research. 1) There is disparity in mathematical ability between madrasah and non-madrasah students in Indonesia. The lower time allocation in learning mathematics (IT dimension in the OTL) in madrasah has a significant effect on the disparity of mathematical ability. It indicates that more time allocation for mathematics lesson is needed for students in madrasah schools along with the planning of more focussed curriculum by the Ministry of Religious Affairs. In addition, the online learning that has been conducted during the pandemic has shocked all teachers either in madrasah or non-madrasah schools. As a result, the learning materials mastered by the students (CC dimension in OTL) and learning materials delivery quality (QI dimension in OTL) both in madrasah and non-madrasah schools are less effective. This fact is presumably the reason of CC and QI dimensions to have no effect on the disparity in students' mathematical ability. Hence, to find more stable results, further research under a normal (non-pandemic) condition is suggested to examine the three dimensions of OTL in more details.

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