



“We Need Supervisors”: Problematic Implementation of Curriculum 2013 among Mathematics Teachers

Setiawan Setiawan, Khairiani Idris

IAIN Lhokseumawe

Correspondence: ✉ setiawan8872@gmail.com

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Abstract

The development of curriculum is a dynamic process which aims to comply with the evolvement of knowledge and technology. However, the implementations of reformed curriculum have been acknowledged to raise various issues. Likewise, among the issues related to the implementation of the Curriculum 2013, known as K13, in Indonesia were teachers' difficulties, including mathematics teachers. This study aimed at investigating and describing the difficulties faced by junior high school mathematics teachers in implementing K13. The study applied a mixed-method approach involving 66 from the total of 78 junior high school mathematics teachers in Lhokseumawe, Aceh Province, as the study sample. The findings showed that 50%-60% participants are encountering difficulties in components of trainings and socialization of K13, lesson planning, learning action, and assessment and reporting the learning outcome. Although 93.94% teachers have taken the K13 training, but only 56.45% of them sometimes implemented the curriculum in the classrooms. Additionally, the main resource of the difficulties was the ineffectiveness of trainings and socializations of K13 the teachers had attended. The teachers expected that there would be a learning community or forum as the follow-up action of the trainings, which can supervise the implementation of K13 in their classes. The directions for further research to improve the curriculum implementation were discussed.

INTRODUCTION

A reform in school curriculum is a need for a country to comply with the development of knowledge and technology from time to time. The reforms have been conducted in many countries with diverse focuses. For examples, the recent focuses of the reform have been on ICT in Asia regions [1], digital literacy in Netherlands [2], and Scientific skills in Mexico [3]. Accordingly, the recent reform curriculum in Indonesia, known as *Kurikulum 2013* (K13), focuses on integrating attitudes, skills, and knowledge [4].

Before the implementation of the current K13, reforms in school curriculum in Indonesia have been taken place since the Dutch colonial era. The first curriculum recorded in Indonesia is the Dutch colonial era (*Kurikulum Periode Penjajahan Belanda*), following by the curriculum during the Japanese Colonial era (*Kurikulum Periode Penjajahan Jepang*), the curriculum in the transition period from Japan to the Confederate (*Masa Peralihan dari Jepang ke Sekutu*), Post Independence Curriculum, Decomposed Lesson Plan (*Rencana Pelajaran Terurai*) in 1952, curriculums in 1964, 1968, 1975, 1984, and 1994, Competency Based Curriculum in 2004-2006, and Education Unit Level Curriculum (*Kurikulum Tingkat Satuan Pendidikan*) in 2006-2013 [5]. The earlier reforms were mostly influenced by political situations, e.g., specific subjects related to patriotisms were added or removed in the curriculum reforms during 1964-1994 [6]. The more current reforms, on the other hand, have more emphasis on the improvement of student learning, e.g., on cognitive accomplishment in curriculums during 2004 until 2013 and skills of observing, questioning, reasoning, and communicating in K13 [7].

K13 provides the learning and teaching situations which conform to characteristics of students in the current era. Through the scientific approach embedded in the curriculum, students are encouraged to actively participate in the learning processes. When properly applied, the learning can bring positive impacts on students, e.g., improving students' disciplines and responsibilities [8][9], performances, mathematical reasoning skills, as well as learning interest [10][11]. On the other hand, studies have suggested that implementing the scientific approach properly was not without difficulties [10][11]. Besides, the complicated assessment components in K13 have been among the notable issues encountered by teachers[12][13].

More particularly for mathematics subject, the approach would provide more opportunity for students to learn by revealing their ideas mathematically, observing and questioning in order to be able to find mathematics concepts by themselves. Nonetheless, most students encounter difficulties in trying to understand mathematics subject through reading or doing activities by themselves. There are a lot of efforts and skills required for teachers to design and apply proper learning methods embedded the scientific approach to make students understand materials in mathematics classrooms [16]–[18]. Besides, the time allocation in designing lesson plan as well as the complicated processes for evaluation [15][16] were among the concerns raised by mathematics teachers.

There have been plentiful studies focusing on mathematics teachers' difficulties in implementing K13, but those involving mathematics teachers from Aceh Province, more particularly, from Lhokseumawe city, have been hardly found in literature. The development in the sector of the education has not been conducted evenly in all the districts and cities in the province, while teachers' competency has been in low rating in the country. Moreover, Lhokseumawe city is located in the coastal area about 300 KM from Banda Aceh, the capital city of Aceh Province. Schools located in the coastal areas in Aceh have generally been subjected to insufficient educational facilities, like internet, which resulted in low technological literacy skills among students and teachers [20], whereas, the skills are essential for K13 curriculum implementation. Accordingly, this study aimed at investigating the difficulties encountered by mathematics teachers' from Lhokseumawe in implementing K13. Considering their demographic background and competencies, mathematics teachers from Lhokseumawe might have some different difficulties related to the implementation of K13. While the studies focusing on teachers' difficulties in implementing K13 typically adopted qualitative approach, we applied a mixed-method approach by using an instrument consisting of several closed and open-ended questions. The findings were expected to reveal difficulties of all junior high school mathematics teachers in Lhokseumawe in a more fruitful way, thus, would give valuable information for educational stakeholders in making policies for improving educational qualities in the province. Besides, the instrument developed in this study has a potential to be utilized for further studies aiming at investigating teachers' difficulties involving a large sample.

METHODS

This study applied a mixed-method approach, in which a descriptive quantitative was combined with a descriptive qualitative method in collecting and analyzing data. The quantitative and qualitative methods were combined in data collection by using a questionnaire containing closed statements and open-ended questions to reveal teachers' difficulties in implementing K13. Subsequently, data from closed statements was analyzed quantitatively by calculating percentages of each difficulty component, while teachers' responses to the open-ended questions were analyzed qualitatively by doing content analysis [21]. The quantitative findings would reveal levels of difficulties of each difficulty component through the percentages of teachers who encountered difficulties in the component. The qualitative findings, on the other hand, may provide further explanations related to what, why, or how such difficulties were emerged.

Participants

From the total of 78 mathematics teachers separating in 16 State General and Islamic Junior High Schools (SMP and MTs) in Lhokseumawe, Aceh Province, 66 were selected as the participants of study. These participants were selected randomly by taking 2 to 7 teachers from each school. Among those 66 participants, 54 were civil servant and 12 were honorary teachers. The ages of participants ranged from 23 to 50 years old and 77.28% of them had at least 10 years of teaching experience.

Instruments

A set of questionnaires was used to collect data about the difficulties encountered by mathematics teachers in implementing K13. The four themes of the obstacles in implementing K13 [17] were referred in developing the questionnaire. The themes included (1) training and socialization; (2) lesson planning; (3) learning action; (4) assessment and report. Subsequently, the statements for items of each theme were developed by one of the authors by adapting the sub-themes proposed in the study. The first draft of questionnaire was then discussed by the two authors to assure that each item could represent the corresponding theme. A colleague, who was a mathematics education expert, was then invited to read and commented on the draft for validation. Finally, 30 items were included in the questionnaire in form of closed statement, i.e., 4 items for assessing the difficulties related to K13 training and socialization, 5 items for lesson planning, 11 items for learning action, and 10 items for assessment and reporting (see Table 1). In addition, to accommodate other possible difficulties, there was an open-ended question asking the respondents to mention other difficulties they might have encountered in each theme of difficulties. The information obtained from these additional questions would be useful in discussing the findings.

Table 1. Themes and Sub-themes included in the Questionnaire

No	Theme	Sub-theme	Total Items
1	Training and Socialization of K13	The training and socialization could not provide sufficient understanding for teachers about K13	4 items
2	Lesson Planning	Teachers encountered difficulties to arrange lesson time, to arrange the lesson plan, to prepare attitude assessments, and to determine knowledge and skills in arrangement of assessment instruments	5 items
		Teachers require longer time for teaching and learning	2 items
		Students have low self-confidence	2 items
3	Learning Action	Syllabus, the order of learning materials, and books were improper; the school facilities were insufficient for learning activities	3 items
		Difficult to activate the class and conform the lesson plan	4 items
		The assessment system was too complicated, which made difficult to recapitulate students' scores	8 items
4	Assessment and reporting leaning outcomes	Reporting learning outcomes required longer time; teachers have not mastered the technology; there was no technology-based system available to organize the learning outcome reports	2 items

RESULT AND DISCUSSION

Results

The data obtained were analyzed based on the categorization of the 30 items classified in four components, each of which was corresponded to one of the four themes mentioned in the method section. The four components were training and socialization, lesson planning, learning action, and assessment and reporting learning outcome. In addition, there were two items inquiring the information about the implementation of K13, including whether the participants

had participated in any K13 trainings or socializations and whether they have implemented the K13 in their classrooms.

The data showed that there were 62 or about 93.94% participants who have participated in trainings or socializations of K13, while the other 4 have not participated in any K13 training. Those 4 teachers were from Islamic Secondary Schools (MTs). Furthermore, among the teachers who have participated in the K13 trainings or socializations, there were only 27 (43.55%) of them who admitted that they always implemented the curriculum in their classes, while the other 35 (56.45%) said that they sometimes implemented it in their classes. While the 4 teachers who admitted that they have not yet received the trainings or socializations stated that they had tried to learn independently about the K13 system and applied it in their classrooms. However, they acknowledged that the implementation might be disparate from the actual K13 rules.

Table 2. Percentages of difficulties encountered by respondents in implementing K13 for each component

No	Component	Total Items	Percentage
1	Training and Socialization of K13	4 items	57.20%
2	Lesson Planning	5 items	56.67%
3	Learning Action	11 items	57.02%
4	Assessment and reporting leaning outcomes	10 items	50.15%

With regard to the difficulties in implementing K13, we found that more than half of the participants encountered difficulties in the four components (see Table 2). The slightly highest difficulty was in the component of training and socialization (57.20%). This fact might indicate the deficient comprehension on K13 among the teachers, which would contribute to the difficulties they encountered in other 3 components. The details difficulties encountered by the teachers in each component are elaborated in the followings.

The component of training and socialization of curriculum

As mentioned previously, the component of training and socialization of curriculum showed the highest percentages of difficulties among the other 4 components. From the data obtained, it could be deduced that the training and socialization have not effectively made teachers have good comprehension on K13 system. Three main problems were identified in this component: 1) the changes in K13 system which were often issued before teachers fully grasped the previous systems; 2) the time allocated for the training was insufficient; and 3) there was no follow up action to accommodate problems encountered by the teachers in schools related to the K13 implementations.

Table 3. Percentages of items in the component of training and socialization of K13

No	Item statement	Percentage
1	I encounter difficulties in understanding K13 system because the time of training and socialization was insufficient	61.19%
2	I feel that I did not optimally understand K13 system because the time allocated for training and socialization of K13 was ineffective and not efficient	55.22%
3	I encounter difficulties in understanding K13 system because there are often changes in the regulation without proper socialization	73.13%
4	I encounter difficulties in understanding K13 system because there were differences in views and interpretations among the trainers	35.82%

Table 3 shows that the highest percentage was in the difficulty of understanding K13 system due to the changes of regulation without proper socialization (73.13%). The teachers stated that often the changes of regulations in K13 system were issued when they had not fully grasped the previous K13 system. As the result, they became more confused about the system,

since, in their opinions, the new system would be understandable only after one have fully grasped the previous systems.

The insufficient time of training and socialization shows the second highest percentage of difficulty (61.19%). The teachers complained that the trainings provided were insufficient given the abundant materials to deliver. Sometimes, the trainings were scheduled in a full-day long with heavy materials to catch up. This would be worthless as most participants would feel exhausted so that it would be hard to grasp the materials. The teachers suggested it would be more effective if the trainings are conducted within semester breaks, in which there is no teaching or other school work burdening their mind.

Additionally, the trainings were conducted only to socialize the K13 materials without any follow up actions to supervise the curriculum implementation conducted by the teachers after the trainings. As the result, the teachers did not have forum for further discussing problems they encountered in the schools.

The component of lesson planning of K13

The component of lesson planning was the third most difficult component among the 4 components, i.e., 56.67%. There were 5 items included in this component.

Table 4. Percentages of items in the component of lesson planning

No	Item statement	Percentage
1	In developing a K13 lesson plan, I found it difficult to arrange teaching time to effectively accommodate 5M	55.22%
2	In developing K13 lesson plans for one semester, I found it difficult to manage teaching time because there are too many learning materials to cover	64.18%
3	I encountered difficulty to determine which methods to use for assessing attitude (K1 dan K2) in K13 lesson plans	47.76%
4	It was difficult for me to determine observed items in the instrument of attitude assessment (K1 dan K2) in K13 lesson plans	47.76%
5	I found it difficult to distinguish the assessment for knowledge (K3) and skills (K4) in K13 lesson plans	64.18%

Table 4 shows that the most significant percentage is in items 2 and 5, i.e., the difficulty related to managing learning time due to the plentiful materials and the difficulty in determining assessment for knowledge and skills. Teachers stated that mathematics required longer time for most students to learn. Due to the hierarchical nature of the subject, it would be impossible for teachers to teach new materials while the previous ones had not been grasped by the students. Therefore, it was difficult for math teachers to manage the time of learning in their lesson plans. Furthermore, distinguishing the assessment of knowledge and skills was also found difficult by more than 60% of teachers. The teachers admitted that they had not fully grasped the meaning of the skills to be assessed in the K13 system, or the meaning of skills in mathematics.

The next most difficult was related to arrangement of teaching time to effectively accommodate the components of 5M (55.22%). The teachers contended that the most difficult phase to design learning was in the observing (*mengamati*) phase. They did not have enough learning resources related to proper ways to present mathematics materials, which can be easily observed by students and, in the same time, could motivate student learning. In addition, many teachers admitted that they often used similar forms of lesson plan (RPP) for all materials, although not all mathematics materials would take identical time durations for each of 5M phases.

The component of learning action of K13

The component of learning action was the second highest difficulty (57.02%) among the four components in this study. As presented in Table 5, there were 11 items included in this component. The highest difficulty item was in completing the planned learning materials for low ability students (80.60%). The difficulty was found mostly from teachers teaching in schools

located outside the city center of Lhokseumawe, which are closer to the coastal area. Many teachers teaching in these locations complained about their students' low motivations, willingness, and attitudes toward learning mathematics, which hindered the implementation of K13 in classes. Besides, the teachers stated that another factor hindered the completion of planned materials was that often the low ability students had forgot the prerequisite materials they had learned so that it would take long time to review the materials before starting the new ones.

Another highest difficulty in this component was related to managing students to be active during learning (74.63%). This difficulty may be as well associated with the characteristics of students mentioned above. The next two highest percentages of difficulty were also could be related to students' characteristics, i.e., students' lack of confidence in giving opinions and asking questions during class. The similar comments of teachers were found to be related to these characteristics of students.

Table 5. Percentages of Items in the Component of Learning Action

No	Item statement	Percentage
1	I often found that the time allocated for teaching is insufficient to follow the scientific learning plan using the 5M method	26.87%
2	When teaching in a class with low ability students, I have difficulty in completing the planned learning materials	80.60%
3	I found most students had lack of confidence in giving their opinions about the learning materials in class	68.66%
4	I found most students had lack of confidence in asking questions about learning materials in class	68.66%
5	The erroneous appeared in contents and writings within textbooks I used often disrupted the efficiency of my teaching time	28.36%
6	I often needed extra time to equip students with prerequisite materials because the materials in the syllabus were not in the right order	57.73%
7	I often needed extra time to equip students with prerequisite materials because the materials in the syllabus were not in the right order	61.19%
8	I felt that my students were not ready to follow the scientific learning designs with the 5M phase	55.22%
9	I found it difficult to manage my students to be active during learning in class	74.63%
10	It was hard to encourage my students to ask questions or express their opinions	67.16%
11	I was often impatient when teaching following the scientific learning design due to the long teaching time duration required	32.84%

Furthermore, while in the previous component the difficulty related to managing the time of learning in lesson plans showed high percentages (64.18% and 55.22%), the difficulty related to following the time set in scientific learning plan using the 5M showed the lowest percentage (26.87%). The possible reasons for the inconsistency might be the double information contained in the item statement, which can be categorized as *double-barrelled* questions [22]. That is, when responding to this item, many teachers focused on the phrase "time allocated for teaching is insufficient," while they might always finish the class in time, either or not following the 5M method. Such items might need to be revised or reconsidered if the instrument to be improved.

The component of assessment and reporting learning outcomes of K13

There were 10 item statements included in this component, almost all of which had more than 45% difficulty (see Table 6). In fact, those items could be related to each other, which mean that the difficulty faced in one item might affect into the difficulty in other items. For instance, the highest difficulty was related to the time required for recapitulating the assessment data and integrating them into report cards. Teachers complained about the long processes required for filling out the report cards which cover attitude, cognitive, and skill assessments, which was

related to the item 5 in this component. In addition, the teachers also admitted that their lack skills related to using the report card application was among the factors impeding the processes of recapitulating the assessments. This factor was also shown in item 10.

Relating to the information technology used for report card, the system evaluation in K13 has been supported by report card applications. The transition of curriculum from KTSP to K13 made many teachers, specifically senior teachers, encounter difficulties since the assessments should be input through computer applications, while they were not used to working with computers.

Table 6. Percentages of Items in the Component of Assessment and Reporting Learning Outcome

No	Item statement	Percentage
1	The K13 scoring system is too complicated for me to follow	46.27%
2	I found it hard to apply the observation techniques for assessment when teaching	43.28%
3	It was difficult for me to select the proper assessment technique	52.24%
4	I found it difficult to elaborate the attitude assessment indicators	46.27%
5	I have difficulties in recapitulating and integrating the assessment into report cards because of too many assessment techniques	55.22%
6	In my opinion, writing a description of student learning achievement in making report cards is too complicated	50.75%
7	I need a long time to write a description of student learning outcomes in making report cards	50.75%
8	I feel constrained by writing report cards because I have to collaborate with the homeroom teacher	35.82%
9	I need a long time to recap the assessment data and integrate it into report cards	67.16%
10	In my opinion, Information Technology to conduct assessments is too complicated to use	46.27%

Furthermore, many mathematics teachers in this study complained about the complicated of attitude assessment technique. The assessment technique in attitude consists of piety to the Almighty God, religious tolerance, manners, responsibility, confidence, discipline, caring, and cleanliness. They argued that the components were not easy to assessed in detailed for each student as there were about 25 to 35 students they had in a class.

Discussions

From the data obtained in this study, it could be deduced that despite more than 90% teachers has attended K13 trainings, there were 50% to 60% of them still encountered difficulties in implementing K13 in the four components (i.e., trainings and socialization, lesson planning, learning action, and assessment and reporting leaning outcomes). The key issue may lay on the ineffectiveness of trainings and socialization of K13 provided, which has been also discussed in previous study [17]. The fact that this similar issue still takes place in the country after almost eight years have passed since the curriculum firstly released may indicate more attempts required for the trainings and socializations of K13 to have effective impacts on mathematics teachers. More particularly, teachers in this study complained about the insufficient time of training provided while there were abundant materials to learn. Some of them suggested that the trainings could be more effective if it is conducted during semester breaks and assistance or supervision programs could be provided as a follow-up action after the trainings. In fact, supervision or assistance program for the implementation of K13 has been proved effective in some provinces [23]–[25]. Beside, providing proper guide books of K13, which could be referred anytime by

teachers after the trainings has been also showed to give effective impacts on K13 implementation [26].

Furthermore, teachers in this study were also found to face high difficulties in planning and doing assessment [17][19]. Teachers admitted that they did not fully understand the meaning of skills to be assessed in the K13 system and, in particular, what exactly the skills to be assessed in mathematics. Since understanding the assessment system theoretically did not imply that the teachers would be able to properly implement the assessment in their teaching [27], merely explaining the mathematics skills may not be a proper solution for this issue. Hence, program for improving mathematics teachers' competencies and creativities should be included in the trainings of K13.

The 5M phases of scientific approach were also found problematic for mathematics teachers in this study, which have been also suggested in previous studies [10][25]. Anjarsari[28] found that teachers perceived that conventional teaching approach was more effective for student learning mathematics. They stated that it was not easy to have students understand the HOTS problems in mathematics without teachers explaining the materials. In addition, some teachers in this study stated those students' low motivations, willingness, and attitudes toward learning mathematics, as the substantial obstacles for applying scientific approach and completing learning materials in their classes [29]. Although there have been several ways suggested in literature for effective learning using 5M phases, such as developing proper learning modules and materials [30] and applying proper learning models [31], it has been hard to change the long history of teacher-centered approach in Indonesia.

Teachers in this study, more particularly, complained about the difficulty in designing learning related to the observing phases in 5M due to the unavailability of learning resources and guidance they could refer. To be able to design learning to follow 5M phases indeed requires creativity. Keen analysis to the basic competencies in learning objective can provide insights about what to be observed in mathematics class [32]. However, forcing Indonesian teachers to be more creative might be a hard task for teacher educators. Therefore, changing the educational system, while it might be a big homework for policymakers, could be a feasible solution, e.g., by altering teachers' recruitment system and reformulating teaching evaluation while re-thinking the curriculum of teacher training programs and faculties of education in universities in Indonesia.

The difficulties related to assessment were the component with the lowest difficulty percentage in this study. Teachers mainly complained about the long process required for doing assessment in K13 system and, specifically, the complicated of attitude assessment, given about 25 to 35 students they need to assess in a class. Teacher complaining about the attitude assessment in K13, which have been also found in other studies [12][29], suggested more efforts are required to promote this type of assessment among teachers. Mathematics educators may contribute through providing community service or workshop specific for mathematics teachers related to developing attitude assessment [30][31]. Additionally, the difficulty related to ICT-based application for the report card was mostly encountered by senior teachers. To handle this issue, school could establish a reasonable policy, such as, by assigning teacher assistances for using the application specific to those senior teachers in need.

CONCLUSIONS

This study investigated the difficulties encountered by mathematics teachers in Lhokseumawe, Aceh Province, related to the implementation of K13. The findings revealed that

the main issue was the lack of understanding of the teachers related to the K13 system. Mathematics teachers in Lhokseumawe admitted that the K13 trainings were not effective and suggested that they were to be provided with supervisors, to whom they could consult related to their difficulties in implementing K13. This finding could be taken into consideration by education practitioners related to the improvement of teachers' competency. Meanwhile, mathematics educators could also contribute in resolving this issue by providing community service program related to K13 implementation, such as supervising or assisting the teachers for specific times.

On the other hand, the items of questionnaire used in this study were developed based on the previous qualitative study on assessing mathematics teachers' difficulties in implementing K13. Hence, our study has not only showed the applicability of the difficulty components found from the qualitative study on different participants, but also shed some lights on the possibility of adopting the qualitative findings into a quantitative instrument. Moreover, the instrument developed in our study has a potential to be improved. For instance, "Yes/No" options can be replaced by five Likert-Scale responses for each item and more items can be added based on teachers' written responses to the open-ended questions. Then, using a large sample and item analysis, a valid and reliable questionnaire could be generated. Researchers or educational practitioners aiming at investigating teachers' difficulties in implementing K13 could have benefit from the instrument, given such instrument has been hardly found in literature.

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