



## ***Analysis of student needs of the mathematics club (MC) as a co-curricular activities as an effort to grow up 4C skills***

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**Abstract:** In the industrial revolution 4.0, 4C's skills (critical thinking, creative thinking, collaboration, and communication) are essential for the students. Therefore, starting from elementary school, these skills need to be cultivated. According to Permendikbud No. 23 of 2017, there are 3 activities that must carry out, namely intra-curricular, co-curricular, and extra-curricular. Like intra-curricular activities, co-curricular activities should be structured and systematic as intra-curricular that have teaching material. However, the reality is a lot of school don't have a good preparation for doing co-curricular. Co-curricular is the activities of deepening the material (indicator) there are in intra-curricular, so the material presented in co-curricular activities must be the material that is difficult or that needs enrichment. One of the materials that requires enrichment is mathematics. It is because mathematics has contained difficult material and is usually feared by the students. This article will specifically discuss the needs of students in full-day schools whose co-curricular activities in Mathematics Club (MC) are an cultivate 4C's skills. The method used exploratory research method. The result of this research found that Schools needed activities such as Mathematics Club because the schools had not implemented cocurricular activities optimally.

**Keywords:** cocurricular, mathematics club, 4C's skills, full-day school

### **Analisis kebutuhan siswa terhadap kegiatan kokurikuler mathematics club (MC) sebagai upaya menumbuhkan keterampilan 4C**

**Abstrak:** Di era revolusi industry 4.0, keterampilan 4C (critical thinking, creative thinking, collaboration, and communication) penting untuk dimiliki siswa. Oleh karena itu, mulai dari tingkat sekolah dasar, kemampuan ini perlu ditumbuhkan. Sesuai Permendikbud No 23 tahun 2017 terdapat 3 kegiatan yang harus dilakukan sekolah yakni intrakurikuler, kokurikuler, dan ekstrakurikuler. Layaknya kegiatan intrakurikuler, kegiatan kokurikuler seharusnya juga tersusun secara terstruktur dan sistematis disertai dengan bahan ajarnya. Namun, kenyataannya sekolah belum memiliki kesiapan yang maksimal terkait dengan perancangan dan pelaksanaan kegiatan kokurikuler tersebut. Kegiatan kokurikuler adalah kegiatan pendalaman materi (indikator) yang ada dalam kegiatan intrakurikuler, jadi materi yang disajikan dalam kegiatan kokurikuler haruslah materi yang sulit atau butuh pengayaan. Salah satu materi yang membutuhkan pengayaan adalah materi matematika. Hal ini dikarenakan matematika selalu menjadi materi yang sulit dan ditakuti siswa. Artikel ini secara spesifik akan membahas kebutuhan siswa di sekolah full day terhadap kegiatan kokurikuler mathematics club sebagai upaya menumbuhkan keterampilan 4C. Metode yang digunakan dalam penelitian ini adalah metode penelitian eksploratif dimana peneliti melakukan observasi dan wawancara secara mendalam terhadap kebutuhan sekolah terhadap kegiatan kokurikuler Mathematics Club. Hasil penelitian menemukan bahwa sekolah membutuhkan kegiatan seperti Mathematics Club karena sekolah belum menerapkan kegiatan kokurikuler secara maksimal.

**Kata Kunci:** keterampilan 4C, kokurikuler, mathematics club, sekolah full day

## INTRODUCTION

Elementary school students are usually in the age of 7-12 years old range and are in the operational concrete thinking stage (Piaget, 2013). In the stage, the students can receive and reason concrete bits of knowledge. In line with Piaget, Van Hiele theory of thinking also categorizes the elementary school students as the analytical thinking phase or level 1 (Pakaya et al., 2019). In this phase, the students can group geometrical structures based on their concrete shapes (Primasatya & Jatmiko, 2018). In other words, according to Piaget and Van Hiele theory of thinking, the teaching method for elementary school students should be concretely delivered. This allows the students to receive and reason the information they obtain.

One obstacle which is often complained about by the students is that in the mathematics class, the lesson is often abstract or not concrete. Also, mathematics is abstract in its nature. However, the teaching of mathematics in elementary school needs to be done via concrete media, based on Piaget's theory categorizing them as the operational concrete thinking stage (Primasatya & Jatmiko, 2018). The concrete media can bridge the abstract thinking mathematics with their level of thinking. The media can be presented in the experimental activities, so the knowledge can be optimally transferred.

Relating to mathematics teaching in schools, the program or activity which will be done should also refer to the regulation. In the current curriculum (Curriculum 2013), since 2018 the teaching of mathematics for higher elementary school grades (grade 4, 5, and 6) there is an additional portion (other than the thematic lesson) for  $6 \times 35$  minutes in a week. This will allow the mathematics lesson to be done completely but still comprehensive. Nonetheless, the allocated time used in the mathematics class only allows the students to understand the material, not the 4C's skills which are very essential in the industrial revolution 4.0 era (Zubaidah, 2018). In cultivating the 4C's skills on the elementary school students, mathematics teaching is not only limited to the intracurricular activity but also loaded in the co-curricular and extracurricular ones.

Nowadays, some schools have applied to the full-day system. Since *Permendikbud No 23 Tahun 2017* about the 5-day school system was regulated, controversy has emerged. This is because this regulation is designed for an ideal condition, without considering the infrastructures and conditions in the whole educational system (Miftah, 2018). Nevertheless, full-day school regulation has been applied in many schools. In the city of Kediri, during the 2019/2020 academic year, all middle and higher schools have applied the full-day school system, while in the elementary schools, only a few of them applied, including SD Lab UNP Kediri, SDI Al-Huda, SDN Banjaran 4, SDN Burengan 2, and SDN Sukorame 2.

According to *Permendikbud No 23 Tahun 2017* on article 5, the 5-day school system is used for intracurricular, cocurricular. and extracurricular activities (Mendikbud, 2017). The intracurricular activity is an activity to fulfill the curriculum requirements which is written in the core competencies (CC) and the elementary competencies (EC). In addition to intracurricular, extracurricular activity is very familiar to society. The extracurricular activity is an activity under the guidance and supervision of the school to develop the students' skills

and interests. The extracurricular activity is mainly sports such as taekwondo and basket ball, or activities like scout and junior red cross youth.

Unlike the extracurricular activity, the cocurricular activity is still unfamiliar to the people outside of educational backgrounds. Cocurricular activity is a strengthening or deepening activity to support the purpose of the intracurricular one. The cocurricular activity is aimed to support the implementation and deepen the taught materials, and to train the students' responsibility (Mujiwati dkk., 2020). Knigh & Novoseligch (2017) make a definition of cocurricular activities are meant to be an extension of learning experiences associated with the formal didactic curriculum. An example of this activity is exercises done during the highest grade on every educational level. The basic difference between the co-curricular and extracurricular activities is their relation to the intracurricular lessons. If an activity is done to deepen an intracurricular material, then it is a cocurricular activity. If it is done to develop the students' skills and interests, it is an extracurricular one.

According to *Permendikbud No 23 Tahun 2017*, the teaching media on intracurricular activities have been regulated by the government which is teachers' and students' books, but the teaching media and the implementation of cocurricular activities are directly managed by the school independently or co-worked with other institution outside of the school. This will allow every school to implement a different program that will suit the school's needs and characteristics. Some cocurricular activities which have been done in many schools, such as abacus arithmetic as studied by Rivilla (2014), and movie time, creative day, and reading day in SD Lab UNP as reported by Mujiwati dkk. (2020). However, the cocurricular activities have not been optimally implemented, still incidentally done, and have not yet had adequate materials.

The cocurricular is necessary for the full-day school, especially for mathematics-based competencies. This is because the mathematics lesson in the intracurricular activity has not accommodated the students' needs for deep understanding and experimental activities (Rivilla, 2014). One implementable mathematics cocurricular activity is the Mathematics Club (MC). MC is an experimental mathematics activity implemented to support the mathematics lessons in the intracurricular stage and it serves teaching media. The experimental activity in the MC is expected to develop the students' 4C's skills. This activity is designed differently from the intracurricular lesson. The students conduct experiments while playing games. Specifically, this article elaborates the students' and the school's needs regarding to the MC cocurricular activity for the elementary school students in developing their 4C's skills.

The MC serves experimental activities which are delivered casually so that the students don't feel pressured in doing their tasks. In cultivating the students' 4C's skills, the experimental activities are done in a group to grow their collaboration and communication skills. As stated by Ruqoyah (2018), the experimental activities from the contextual materials can enhance the students' collaboration and communication ability. Besides, the contents of the experimental activities include open-ended exercises with HOTS that will enable them to think critically and creatively. Therefore, it is necessary to design a cocurricular activity MC with the modules and media to conduct the experiments.

## METHODS

The experimental method for this research is a composite explorative method. The steps in the explorative study are topic decision, literature study, data acquisition, data processing, and conclusion making (Morissan, 2017). The topic is chosen based on the research roadmap relating to the MC co-curricular activity to develop the 4C's. The next step is a literature study related to co-curricular activity and the 4C's skills. The research is continued by aligning the experimental instrument and data acquisition and analysis. The result is then discussed and is used to conclude.

Specifically, this study discusses the analysis of the students' and the teachers' requirements. The requirements analysis is conducted to learn the learning condition as well as the students' needs during the lesson (Maulana, 2018). The research was conducted during the COVID-19 pandemic so the data acquisition was done remotely. In conducting the requirements analysis, the researchers use instruments such as questionnaires on students' responses uploaded to google form and it is then broadcasted through the teachers' network in the elementary schools of Kediri City and Regency. The questionnaire contains 15 questions related to 1) the students' interest in mathematic, 2) the students' learning style during class, 3) the depth of the lesson taught during class, 4) media implementation during class.

From the broadcasted questionnaire, there are 242 student respondents, with 46 of them from full-day schools in Kediri City and Regency. In addition to the questionnaire, the researchers also interviewed one sample of students and one of the teachers who are in the full-day school. The interview with the student was done to elaborate on the questionnaire result, while that of the teacher was to learn the teaching process in the full-day school, especially for the co-curricular aspect.

## RESULTS AND DISCUSSION

The requirements analysis was conducted to obtain the information related to the students' requirements during the lesson which then is used to design the teaching media (Suhendri dan Suparman, 2018). The result of this analysis is used to decide the alternative solution to the occurring problems (Putra & Syarifuddin, 2019). This article specifically discusses the elementary school students' requirements for MC in the full-day school cocurricular activity.

The Mathematics Club (MC) is an experimental activity delivered casually, supported with modules and media as its experimental means. This activity allows the students to study more happily with mathematical games. The evaluation of the activity is conducted as an individual game, group game, mathematics tournament, and HOTS problem-solving. The MC module contains the steps in the mathematical experiment along with its evaluation as a game or HOTS exercises at the end of every activity. In the experimental activity, the mathematics media is required to concretize the abstract mathematical concepts. The module as well as the media are designed to be used in a small group of 2-3 people, this is to ensure maximum students' involvement. This is in line with the result from the questionnaire showing that the

majority of the students prefer experimental activity. The result shows that 65% of the students prefer experimental, while 22% are doubtful, and 7% of them dislike it. The result also shows that 71% of the students enjoy playing while studying and 91% of them enjoy studying with media or props which they can use directly (Table 1). According to this result, the co-curricular activity is better with experimental activities involving media and delivered casually as a game, to deepen the students' understanding of mathematics.

**Table 1. The Students' Response Number Recapitulation**

No	Statement in the questionnaire	Percentage of the students' answer			
		Disagree	Doubtful	Agree	Extremely agree
1	I like studying while playing.	15% (7)	13% (6)	30% (14)	41% (19)
2	I like studying mathematics.	15% (7)	22% (10)	48% (22)	15% (7)
3	I understand the mathematics teacher's lesson easily.	0% (0)	43% (20)	48% (22)	9% (4)
4	Class activity is fun.	4% (2)	20% (9)	50% (23)	26% (12)
5	Studying mathematics is more interesting when it involves group discussion.	11% (5)	15% (7)	52% (24)	22% (10)
6	I like studying with media or props.	2% (1)	7% (3)	41% (19)	50% (23)
7	I like studying myself by doing the exercises in the book.	4% (2)	20% (9)	50% (23)	26% (12)
8	I enjoy experimental works.	7% (3)	28% (13)	43% (20)	22% (10)
9	Mathematics makes me dizzy.	17% (8)	22% (10)	41% (19)	20% (9)
10	I don't have a special schedule to learn mathematics at home.	28% (13)	20% (9)	46% (21)	7% (3)
11	I forget what the teacher taught when arriving home.	24% (11)	37% (17)	33% (15)	7% (3)
12	I have notes on what the teacher has taught.	7% (3)	11% (5)	43% (20)	39% (18)
13	I don't enjoy reading the mathematics textbook alone.	33% (15)	9% (4)	46% (21)	13% (6)
14	I prefer listening to my friend's or teacher's explanation on mathematics.	7% (3)	17% (8)	57% (26)	20% (9)
15	I understand fractions.	11% (5)	41% (19)	26% (12)	22% (10)

Up to now, the co-curricular activity in school is dominated by enrichment or exercises conducted in the higher grades in each educational level. Despite that, in some schools, especially the full-day ones, co-curricular activities have been applied more variously. From the interview conducted to a teacher in SD Lab UNP Kediri which implements full-day school, it is inferred that the school has not optimally implemented the cocurricular program. SD Lab UNP Kediri has applied some cocurricular programs including Movie Time, Creative Day, Reading Day, etc. For instance, the Movie Time activity is conducted to support the materials on listening, summarizing, and communicating a story. The movie played is also integrated with the Citizenry lesson (*PPKn*) containing character cultivating to the students. Although the

school has had an interesting cocurricular activity and integrated with the intracurricular one, there are still a few obstacles in conducting the program. The activity is not yet well organized due to the lack of planning on the type of cocurricular activity to be delivered. Consequently, the movie is sometimes unsuitable to the proposed intracurricular activity. In addition to SD Lab UNP Kediri, SDN Banjaran 4 Kediri has also implemented a full-day school. However, like SD Lab UNP Kediri, the cocurricular activity in the school has not progressed well either. Here is a sample of an interview with a teacher of SD Lab UNP Kediri.

- Researcher* : Is there any cocurricular activity in SD Lab UNP Kediri?  
*Teacher* : Yes, there is. We have movie time, creative day, and reading day. In movie time, the students watch a short movie. It can be folklore or another theme. In creative day, the students conduct a scientific experiment. And reading day is related to Bahasa Indonesia in which the students are asked to read a story and tell it back.
- Researcher* : Is there any special module in the implementation?  
*Teacher* : There is no module. The co-curricular activity is spontaneity. So the material is prepared only when conducted, so there is no module yet.
- Researcher* : So the activity itself is not yet structured, is it? Then, is the cocurricular material suitable for the intracurricular one?  
*Teacher* : Sometimes it is, sometimes it isn't. But if we get a suitable material, we will refer it to the intracurricular lesson.

According to the interview, it is inferred that the well-prepared plan for the cocurricular activity is not yet available. The activity needs to be prepared well for it to be optimally implemented. A teaching plan is a process of translating the curriculum to be applied in the teaching process (Sanjaya, 2015). Therefore, the cocurricular which is mandatory in the curriculum requirement needs a good preparation from the material into the media to be used. The design of teaching material for the co-curricular activity also needs to be suitable for the intracurricular one which needs enrichment and deep understanding. Interview with the teacher and the student is necessary to know which lesson needs enrichment in the cocurricular program.

According to the students' questionnaire response, the fraction lesson is one of the difficult lessons to understand. It is proved with the misconception in the material, as seen in Figure 1.

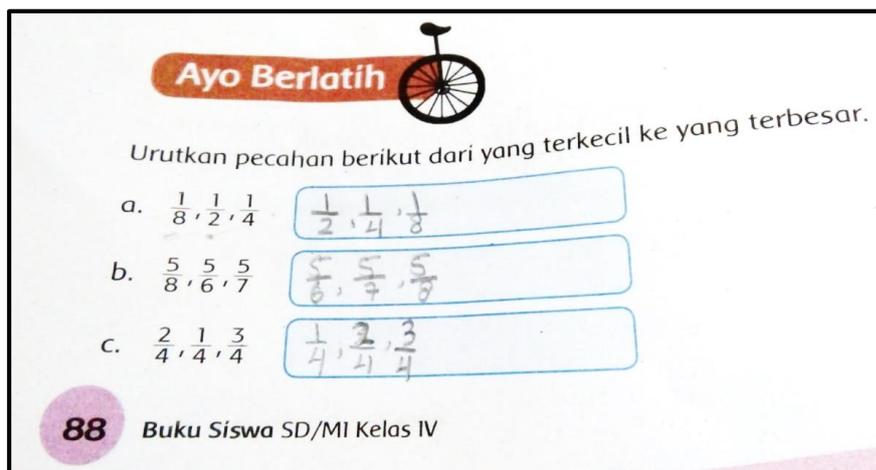


Figure 1. A student's work on arranging fractions.

The researcher asked the student after doing the fraction problem (Figure 1), how the student answers the question. In part (a), the student said that he saw the number in the denominator and arranged from the smallest to the largest, the same goes for part (b). However, in part (c) the student arranged the fraction according to its numerator. Here is a sample of an interview with the student.

- Researcher* : How did you do problem (a)?  
*Student* : Just arrange it from the smallest.  
*Researcher* : So, you think that  $\frac{1}{2}$  is the smallest, don't you?  
*Student* : Yes, I do.  
*Researcher* : Why is  $\frac{1}{2}$  smaller than  $\frac{1}{8}$ ?  
*Student* : Because 2 is smaller than 8.

When the interview was conducted, the teacher also stated that fraction is a difficult lesson for the students to understand. Various studies also indicate the students' difficulty and misconceptions about the fraction. As stated by (Primasatya & Mukmin, 2020; Ermayani et al., 2019; Arsyad & Hakim, 2019), the fraction can be one topic for the enrichment program in the MC co-curricular activity in a full-day school.

In addition to enrichment, the MC activity can also be an activity to develop the students' 4C's skills, to face the industrial revolution 4.0. The experimental activity in MC conducted in a group can grow their collaboration and communication skills. While the supervised discovery which is done in the experimental work and the HOTS can grow their critical and creative thinking skills. In the end, the MC cocurricular activity is needed by the elementary school students to develop their 4C's skills to face the industrial revolution 4.0.

## CONCLUSION

According to requirements analysis by interview, documentations, and questionnaires, it is inferred that the students still consider mathematics a difficult lesson. The students prefer experimental activity in a casual game similar to their extracurricular activities. Referring to

these results, it is necessary to have an activity like MC which doesn't make the students feel pressured. In order to develop the students' 4C's skills, experimental works are done in group to grow their collaboration and communication skills. The contents of the experimental works include open-ended problems and HOTS problems allow them to develop critical and creative thinking. Hence, it is necessary to design a cocurricular activity mathematics club (MC) containing modules and media to conduct the experimental activities.

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