

## Students' Participation and Collaboration Skills through RADEC Learning Model and the Influencing Factors

Citra Bahadur Hanum<sup>1</sup>, Wahyu Sopandi<sup>2</sup> & Atep Sujana<sup>3</sup>

<sup>1,2,3</sup> Program Studi Pendidikan Dasar, Universitas Pendidikan Indonesia, Bandung, Indonesia

✉ [citrabahadurh13@upi.edu](mailto:citrabahadurh13@upi.edu)

**Abstract:** This study aims at identifying forms of participation and collaboration through RADEC learning and the influencing factors. The subject of this study comprised 32 students (18 males and 14 females) attending an elementary school in Bandung city. Case study with a qualitative approach was employed as the method of the study by utilizing instruments such as observation sheets, student work sheet, and field notes. Obtained data were analyzed using Miles & Huberman's (1992) technique with data validation using reference material techniques and methodological triangulation. The results reveal that (1) doing assignments, asking questions, delivering opinions and arguments, giving responses and making conclusion are forms of participation students engage in the classroom, (2) students collaborated through group work, active participation and contribution in the group assignment, listening and discussing a variety of topics, showing appreciation, matching assignments and work, cooperate to gain ideas and realize them through a respectful and proper decision making, and (3) several factors influence the students' participation and collaboration, namely confidence, hard work, and teachers' stimulation. These results signify that RADEC learning is able to stimulate students' participation and collaboration.

**Keywords:** Participation, Collaboration, Elementary School, RADEC.

### 1. Introduction

Those who are most actively involved and play a role in both the workplace and society can be predicted based on their formal education (Davidsson & Honig, 2003). The foundation of a nation can be measured by its advance education. Nowadays, however, education is no longer provided through dogmatic learning, but rather through flexible and accessible methods to help the students become adaptive in the current society. To form a strong human resource is a long-term process that needs school as the education institution. The result of this learning process can be observed when the students give impacts to the society through their participation and collaboration. The 21<sup>st</sup> century has become most advanced era of information and technology, both locally and globally, that provides numerous opportunities to obtain information and knowledge. In addition, social media also make it easier for people to meet new friends and gain information from all around the world. For this, young people needs to master the 21<sup>st</sup> century skills, namely critical thinking, communication, collaboration, citizenship, creativity, and connectivity to be successful as individuals, citizens, and workers (Kivunja, 2014). Needless to say, educational institutions are requisite in facilitating students to master the 21<sup>st</sup> century skills (Samavedham & Ragupathi, 2012). Due to numerous opportunities to exchange information and relation globally for the students to collaborate with their peers in other countries, these institutions must innovate to provide the students with the skills necessary in the 21<sup>st</sup> century. These skills are key and can be considered the driving factors and objectives of the learning process in the implemented curriculum (Voogt & Roblin, 2012). Making learning relevant to the bigger picture, disciplined teaching, providing lower order thinking skill (LOTS) and higher order thinking skill (HOTS) are all teaching principles that can be used to teach 21<sup>st</sup> century skills. These skills help students learn from a different perspective, provide knowledge transfer, provide metacognition learning, ensure direct understanding, stimulate teamwork, and use technology as a tool to develop creativity (Saavedra & Opfer,

2012). Since education is a lifelong conscious and planned pursuit while school mostly lasts for 12 years, most educational processes take place outside of school (Collins & Halverson, 2010).

### 1.1. Problem Statement

In March 2021, UNESCO (2021) reported that 171,341,667 students worldwide were not attending school due to both temporary and permanent closures. Some researchers discovered that current students lack the skills necessary to collaborate, coordinate, and work in teams to complete assignments that require problem-solving (Barron, 2003). The students are unable to engage in group discussion, they lack attention, interrupt others who are expressing their opinions, and reject alternative suggestions without reasonable justification. The literature on collaboration study shows the numerous challenges that teachers and students encounter in a variety of learning subjects, including economics, social studies, and math, from elementary school to undergraduate study on many continents, including Europe, America, and Asia (Le et al., 2018). If this phenomenon persists, education in Indonesia is likely to experience a decline in the quality of graduates who are expected to be the future generation of the country. This eventually will result in the quality of learning that no longer leads to positive changes. Consequently, the community will be filled with graduates who lack competences.

As technology advances, expectations placed on education get higher—graduates are expected to contribute positively to the country. Education is not limited by the classroom, it is accessible everywhere (Okesina, 2019). Classroom should never become a barrier to students' learning, instead it should be a safe space for experiments before they graduate and enter the society as educated individuals. There is a lot of pressure on the students and teachers to lead the way in developing Indonesia through education. The relationships between teachers and students typically revolve around shared interests and patron-client relationships. However, the positive and cooperative student-teacher relationships and the presence of school spirit are the actual indicators of the school climate (Libbey, 2004). The context of relationships that encourages reciprocity and stimulates students' participation is not only developed for formal learning purposes. Instead, it is a way to create pleasant and fun situations.

Currently, how information is delivered is just as crucial as how to make learning engaging for both students and teachers. The society insists that schools need to enhance students' skills, given that social values are currently no longer regarded due to the globalization effect, such as the current growing and increasing tendency of negative behavior among adolescents (Agboola & Chen, 2012). These findings crush people's hopes for students who, in their eyes, ought to work well with others and make a significant contribution to society.

To master the 21<sup>st</sup> century skills, innovations in learning needs to be made. RADEC is an innovation in teaching method that stands for read, answer, discussion, explain, and create. RADEC contains learning steps that make it easier for teacher to implement in the classroom. RADEC allows teachers to make worksheets for students that contain information and questions, as well as the knowledge of 21<sup>st</sup> century skills (Sujana et al., 2021). The students are asked to answer the questions individually at home and collaboratively with their peers as a team at school.

### 1.2. Related Research

A study by Abidin et al. (2021) tried to apply RADEC to improve the 21<sup>st</sup> skills, such as critical thinking, problem solving, creativity and innovation, communication and collaboration among elementary school students. They found that (1) lesson plans train the teachers to prepare learning materials, (2) RADEC has a systematic, clear, and simple syntax, (3) RADEC develops the students' 21<sup>st</sup> century skills, (4) collaboration of 4C (critical thinking, collaboration, communication, and creativity) is found in RADEC learning process. A recent study conducted by Asmara (2022) emphasizes the students' active role in learning. This R&D study find the result of three post-tests (expert validations, teacher practical response, and effectiveness of students' data) that RADEC model is valid, practicable, and effective to use for students in learning. Another study by Maulana et al. (2022) focused on the development and validation of students worksheet with "Water" theme based on RADEC and the 4C skills orientation. The

worksheet using RADEC to develop 4C is valid through the calculation  $V_h > V_t$  or  $V_h > 0.64$  and is considered suitable for learning. A study by Zhong et al., (2022) investigated the impact of esports in developing 21st century abilities in the younger generation. It was found that the greatest attention was paid to collaboration and communication skills, with little focus on life and career skills (creativity, innovation, information literacy, and citizenship). The next study was conducted by Mundelsee & Jurkowski (2021) which examined students' participation and collaboration through the Think-Pair-Share (TPS) strategy. The results of the study revealed that students expressed their reluctance, and how they felt about raising their hands, expressing anxiety, and motives for not raising their hands. The next collaborative study was conducted by Frykedal (2018) focusing on investigating and describing students' inclusive and collaborative processes in group work and how teachers supported or hindered these activities. The results showed that students' active participation in group work discussions and analytical discussion, together with clearer teacher feedback and avoidance of traditional authoritative roles, are examples of preconditions for group work to be inclusive. Based on the aforementioned RADEC studies, RADEC learning model is thought to be effective in enhancing HOTS or 4C. However, it appears that this model has not been tested for participation and collaboration skills. This study investigates students' participation and collaboration and the factors that influence it through RADEC learning.

### 1.3. Research Objectives

Based on the explanation above, various studies related to the RADEC model, participation, and collaboration produce maximum findings. Starting from that, this study aims to investigate participation and collaboration skills among the students in an elementary school in Bandung through RADEC and factors that influence these skills.

## 2. Theoretical Framework

### 2.1. Participation

In this study, participation is particularly interpreted as students' mental, emotion, and physical involvement to initiate a team work to create innovation, give support to achieve something and have responsibility of their acts (Paavola & Hakkarainen, 2005). As Lickona (1991) predicted, there are ten signs of modern era appear nowadays, namely an increase in violence and vandalism, an increase in robbery, a habit of cheating in tests, a lack of respect for teachers and parents, a fanaticism towards a group, a bad grammatical usage, an increase in sexual harassment, a lack of responsibility, a lack of work ethic, and feeling distrustful among others, and an increase in self-destructive behavior. On the other hand, students' competency, students' understanding, and students' appreciation can be achieved if they give active contributions (Soong et al., 2001). With the rise of students' participation in learning, the next step can be focused on educating and developing each student's potential to the greatest extent possible. Participation holds an important role in students' success and the development of their personalities (Mustapha et al., 2010). There are several indicators of students' participation, such as asking questions, answering, providing rebuttals, participating in learning, and performing well on assignments (Huang, 2022). Prioritizing the participation skill as a learning component should be optimized by modifying the learning process. Stimulating students' participation can be accomplished by choosing a suitable topic, motivating students to give and explore the correct response, creating a group working environment, and instilling a sense of discipline in the classroom (Narvaez & Lapsley, 2008).

### 2.2. Collaboration

The definition of collaboration goes beyond active participation in class. Collaboration leads to the ability of individuals to contribute effectively in groups by involving knowledge, appreciation and problem solving (Scoular, et al., 2020). Collaboration skill becomes an important result of education to not only develop, but also to assess (Lai, 2011). The idea of collaboration becomes the peak point in digital standard competency in UNESCO (2015), it means that from the perspective of pedagogy—aspects within knowledge level acquisition—practical pedagogy that is centered on students projects that is combined with team work.

The significance of collaboration skill in learning is supported by many learning concepts, particularly in social-cognitive and social-constructive perspectives, focusing on the importance of the students' participation in social interactions (Webb et al., 2008). Empirical evidence is linked to positive collaboration ideas to explain personal understanding and achievement (Veenman et al., 2005). There are 15 indicators of collaboration skills as presented in Table 1 below.

**Table 1.** Indicators of Collaboration Skills

No	Indicators of Collaboration Skills
1.	Work productively together with peers
2.	Participate and give contributions
3.	Balance in listening and giving opinions, become both a leader and a participant in the group
4.	Be flexible and compromise
5.	Work together with diverse people
6.	Appreciate opinions
7.	Have the skill to choose a perspective
8.	Respect peers' contributions
9.	Divide the work and assignment according to each person's capabilities
10.	Work together in concluding several peers' opinions
11.	Participate properly in a discussion, debate, and argument
12.	Commit to prioritizing the team's needs
13.	Prioritize the group's needs and the group's interest
14.	Work together to solve a problem and produce ideas and new innovation
15.	Be responsible to finish the work together

(Source: Greenstein, 2012, page. 28)

An important aspect of collaboration skill is its application in elementary learners, which can increase significant results and esteem among all students (Tikunoff & Ward, 1983). In the learning context, collaboration skills may be divided into three parts: consultation, colleagues, and cooperation (Krentz et al., 1996). These three are the basis supporting the implementation of collaboration process.

The ability to collaborate is rooted in social adaptability, empathy, and a desire to help, care, be virtuous, and thorough (Dereli & Aypay, 2012). These elements support students' sustainable daily life. Furthermore, skills enable students to minimize failure and maximize learning opportunities (Gettinger & Seibert, 2002). This issue promotes collaboration as the main objective for all formal education institutions.

### 2.3. RADEC Learning Model

RADEC learning model is an innovation in education. The term RADEC implies several steps of learning, namely read, answer, discuss, explain, and create. The creation of this method was based on three aspects; (1) the objective of national education being educating people through the use of resources such as books and online information; (2) the perspective that reading is a skill; and (3) Vygotsky's theory regarding social-constructivism (Sopandi, 2017). There are terms in constructivism theory, namely the actual development level or the ability to complete tasks without any help from others, the potential development level or the ability to complete tasks with the help of others, and the zone of proximal development or the distance between actual and potential developments (Lui, 2012; Vygotsky, 1962).

According to Sopandi (2017), RADEC learning method has seven advantages:

- (1) Motivate the students to read and improve their reading skill;
- (2) Increase the students' preparedness for classroom or laboratory study;
- (3) Improve communication skills, both oral and written;
- (4) Improve group collaboration skill;

- (5) Boost creativity by using their expertise to generate ideas for analyzing and solving problems, particularly those related to daily life;
- (6) Increase the teachers' effectiveness in helping students, creating a student-centered learning, and encourage students to interact with their peers; and
- (7) Stimulate the development of multi-literacies (technology, science, communication, literature, and culture) and the learning syntax should be simple to remember and understand.

In more details, the syntax of RADEC learning model is described in Table 2 below.

**Table 2.** Steps in RADEC learning model

Steps of Learning	Activities		Collaboration and Participation Skills
	Teacher	Student	
<b>Read</b>	Supervise the students when they are reading and doing their assignments	Retrieve a lot of information from various sources. (books, written text, and internet)	None, since it's individual learning
<b>(Learning process)</b>	Supervise the students when they are reading and doing their assignments	Retrieve a lot of information from various sources. (books, written text, and internet)	None, since it's individual learning
<b>Answer (pre-learnings)</b>	<ul style="list-style-type: none"> <li>- Encourage the students who have already finished their assignment on the work sheet to explain it to their friends who do not understand it</li> <li>- Encourage the students who are still confused about the learning to ask their peers for clarification</li> <li>- Make sure the students communicate properly</li> <li>- Observe the group who either understand the materials or not</li> </ul>	Discuss the assignment and the teacher's question in a group setting.	Yes, through discussion and agreement as the result of the group discussion
<b>Discuss</b>	<ul style="list-style-type: none"> <li>- Make sure that the presenter offers accurate scientific information that the students can grasp.</li> <li>- Encourage them to question, argue, or supply additional information upon the presentation from the group presenter.</li> <li>- Clarify important concepts to students who are still confused.</li> </ul>	The group's representative explains an essential concept that they are already familiar with.	Yes, since students must express their opinions, argue, and provide additional information to another group's presenter.
<b>Explain</b>	Encourage students to create ideas, then guide them through the process of making them a reality and making a following report.	Discuss each student's creative thinking to make realization from, write	Yes, the students need to deliver their own ideas, assess others' ideas, express agreement, discuss

Steps of Learning	Activities		Collaboration and Participation Skills
	Teacher	Student	
		it down, and create a report on it.	the realization plan, work together to make it happen and report the ideas and the results.

(Source: Sopandi, 2017)

### 3. Method

#### 3.1. Research Design

This study aims to describe the participation and collaboration skills of elementary school students using the RADEC learning model. This study began with a preliminary study to obtain data related to participation and collaboration skills. Based on the results of the preliminary study, a RADEC-based learning process was carried out on learning materials in the fourth grade of elementary school. During the course of learning, observations, field notes, and distribution of work sheets were conducted out to collect data on students' participation and collaboration skills. The students' participation in the study, the instruments used, the analysis and the validity of the obtained data, and the ethical considerations applied are presented in the following description.

#### 3.2. Participant

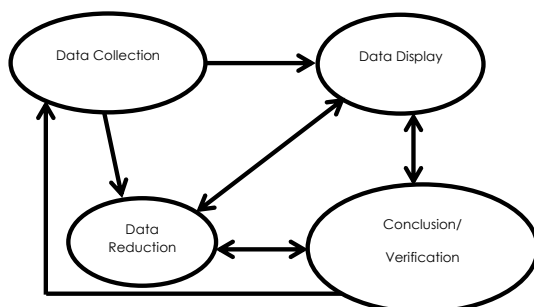
This study focused on the fourth grade students with the total of 32 students (18 males and 14 females) in an elementary school in Bandung City, West Java, Indonesia. The reason for this selection was based on findings obtained through preliminary studies that were in accordance with the requirements for the implementation of RADEC learning model. According to pre-collecting data gained by interviewing the teacher, 31 students already had intermediate level of reading skill while one student was still in basic level. Regarding their background, some students had parents who worked as employees, while some others worked as merchants and labors. In the teacher's perspective, all of the students were enthusiastic during learning comprehension that they helped their friends in studying. In learning absorption process, students were categorized as excellent, sufficient, and need more attention. The participation and collaboration skill that they had included asking questions, giving responses, delivering arguments, and leading a group. Students with those characteristics were divided into six groups in panels, each group consisting of four to six people.

#### 3.3. Data Collection

The data were obtained from research instruments, namely observation, work sheet, and field notes. The researcher used participative observation to know the depth of students' participation and collaboration in the class room. Each student got a work sheet that contained some questions about participation activity and collaboration. Meanwhile the field notes was used to jot down unique behaviors outside excluded in the observation indicators.

#### 3.4. Data Analysis

The Miles and Huberman's model was utilized as a data analysis tool to obtain adequate and clear data. It is made up of the following steps: data collection, data reduction, data display, and conclusion or verification. These stages are visualized in the following Figure 2 below.



**Figure 1.** Four Steps of Miles and Huberman's Data Analysis  
Source: Miles & Huberman (1992)

### 3.5. Validity

The results of data analysis were validated for their credibility, dependability, conformability, and transferability. The data credibility was ensured by the researcher's attempt to verify the validity of the data by confirming the data gathered with the research object. The goal was to prove that what was observed corresponded to what actually happened in the field. It can be done by the triangulation methodology (comparing information from different instruments such as observation, work sheet, and field notes) and reference material (a supporting validation technique from all other techniques, it is necessary to have a transcript of field findings). This technique was carried out to support the validity as well as to prove the findings in the field. For example, observational data is proven through videos or photos, work sheets are proven by the results of students entries, and field notes are proven by the results of unique notes found during the study. Next, the dependability test was carried out by conducting an audit of the entire research processed by independent auditors or supervisors, starting from determining the problem, entering the field, determining data sources, conducting data analysis, testing the validity of the data, and making conclusion. Then, confirmability test was carried out by means of a test of agreement on the research conclusions. Lastly, transferability test was carried out so that the research questions could be applied or used in other situations. Therefore, the results of the study are described in a detail, clear, systematic, and reliable way. Data gathering with resources and other data collection techniques were used to gain a new perspective on the investigation. It is related to the goal of obtaining credible and credible data.

### 3.6. Ethical Considerations

Providing information to research subjects to be used as primary data is fundamental. The data in this study was collected with the consent and participation of the research subjects. After acquiring research permits from the principal and homeroom teacher, data collection proceeded. Furthermore, students were given information about the learning process to be carried out in the learning process. Findings from scientific study were used as a valid data source and published as a basis of accountability.

## 4. Findings

This study concerns upon the identification of the students' participation and collaboration through RADEC learning model. Three findings were acquired; (1) elementary students' participation using on RADEC learning model, (2) elementary students' collaboration in the classroom using RADEC learning model, and (3) factors that stimulate students' participation and collaboration in learning using RADEC model.

#### 4.1. Elementary Students' Participation Using RADEC Learning Model in Decision Making

Participation is considered as the most fundamental aspect in the learning process. It is focused on achieving the learning goals while creating a positive and active environment during the learning process. Participation is useful in both school and social life so students can be more adaptive in every situation. The results of the observation illustrate details of each student's assessment during the RADEC learning process. The five questions asked during the learning process draw in lower order thinking skill (LOTS), middle order thinking skill (MOTS), and higher order thinking skill (HOST). The observation result of students' participation skill is visualized in Table 3 below.

**Table 3.** The Calculation of Students' Participation Skill

No	Indicators	Number of Student
1.	Do the assignment properly	32
2.	Follow the learning properly	28
3.	Present the answer on the panel	32
4.	Ask questions	15
5.	Give additional information or arguments	15
6.	Give objections	2
7.	Give responses	20
8.	Make conclusions	20

(Source: Prosesed in 2022)

Table 3 above depicts the calculation result of the total findings of students' participation. The findings incorporated learning activities of the RADEC model containing eight dimensions that can be observed during the learning process. Following the RADEC learning steps, firstly the students did the *Read* stage by reading the teaching materials provided by the teacher in the students work sheet.

Secondly, in the *Answer* stage, the students were asked to answer questions individually. The researcher observed 100% or 32 students did the assignment, checking the item 'do the assignment properly'. The *Read* and *Answer* stages were fundamental as the green light to continue to the next phase. Since the students followed the instruction, 87.5% of them or 28 students could follow the learning process. The remaining four students needed additional explanation from the teacher and peers through this RADEC learning. Following a panel presentation, some questions were asked and the rest of the students tried to answer them through group discussion to present the best answers. Here, a dimension of presentation emerged, that was answers from each group represented by a group leader. This was *Explain* stage, gained 100% or 32 students' participation. During this *Explain* stage, 46.9% or 15 students asked some questions to the panelist, 46.9% or 15 students provided additional information to support the opinions, while 6.25% or two students expressed objections. It was observed that 62.5% or 20 students were involved in this response stage. This result was obtained from how the students responded to the teacher's questions regarding the preparation of their presentation materials, how they answered based on their presentation, and how they assessed other groups' presentations. Next, the panelist presented all the answers to make a conclusion for the big group discussion that would gain the arguments and additional information from the peers as an attempt to reach a comprehensive conclusion. The dimension of 'make conclusions' stage involved 93.7% or 30 students' participation.

#### 4.2. Elementary Students' Collaboration in the Classroom Using RADEC Learning Model

The manifestation of collaboration is linked to every individual's participation, which results in positive systematic learning. It also appears in the learning process, which requires continuity. Observation on elementary school students' collaboration skill among six groups are visualized in Table 4 below.



**Table 4.** The Result of Students' Collaboration in Groups

No	Collaboration Indicators	Number of Groups
1.	Productive team work with peers	6
2.	Active participation and contribution	5
3.	Balance in listening and speaking, become both a leader or a participant in the group	4
4.	Appreciate the other groups' opinions	5
5.	Decide and select the work based on each person's capabilities	6
6.	Work together to make a decision based on opinions	6
7.	Participate respectfully in discussion, debate, or argument	5
8.	Work together to solve a problem and come up with new ideas or innovations	6

(Source: Processed in 2022)

Table 4 illustrates the observation results among the students in groups based on eight observable collaboration indicators. Firstly, the six groups did productive team work with peers, decided and selected the work based on each person's capabilities, and worked together to solve a problem and came up with new ideas or innovations (100%). Meanwhile, only five groups did active participation and contribution and appreciated the other groups' opinions (84%). Next, only four groups were balanced in listening and talking, becoming both a leader or a participant in the group (66%). Meanwhile, five groups showed appreciation towards the other groups' opinion (84%). On the other hand, all groups decided and selected the work based on person's capabilities (100%). Similarly, all groups worked together to make decision based on opinions (100%). Respectful participation was performed by five groups (84%), and all panelists worked in groups to solve a problem and came up with new ideas (100%). Specifically, RADEC learning stimulated the students to invent an innovation that analyzed and solved a problem together in a team.

The fieldnotes showed that the students got involved in the *Create* stage by conveying ideas, discussing, and selecting a work that they wanted to create. Every group was granted an opportunity to deliver their opinions about it. They discussed, checked their peers' works, and decided a resolution from the discussion. Two groups made crossword puzzles, two other groups made an art with elastic wax, and the last two groups made a mind map.

#### 4.3. Factors Stimulating Students' Participation and Collaboration in Learning with RADEC Model

The development of participation and cooperation skills need both a stimulus and media that support teachers in doing so. This study frames the RADEC model as a bridge for students to develop a wide range of skills, including participation and collaboration in class. The results of students worksheets are described in Figure 4 below.

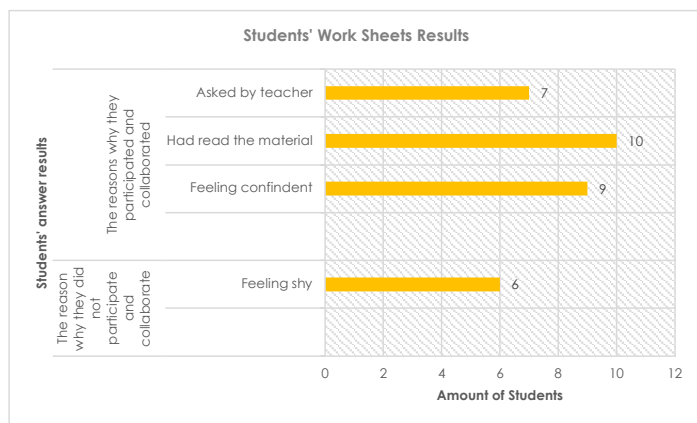


Figure 2. Students' Worksheet Results  
(Source: Processed in 2022)

In light of the results from the students' worksheets on the factors that influence how students participate and collaborate, it was evident that both internal and external factors contributed to the development of students' participation and collaboration. The internal factors included nine students who stated that they could perform well because they felt confident, while ten students stated because they had already read the material beforehand. In the external factors, seven students stated that the teacher asked them to give opinions, arguments, questions, and conclusions. Meanwhile, six students did not participate because they were shy.

### 5. Discussion

The education field currently seeks to fully develop students' potential, including their cognitive capabilities and the 21<sup>st</sup> century skills. As the world changes, teachers can integrate technology and apply various strategies, models, approaches, and methods to support the quality of learning. The task of creating educational activities using acceptable and appropriate learning models can be delegated to the teacher. Based on the RADEC learning model, this study investigated students' participation and collaboration more thoroughly and came up with three findings. Data analysis was done based on observation, field notes, and worksheets to support ideas that are directly related to the findings.

Following the observation, it was concluded that the eight coherent participation skill indicators provided the highest results. To put it another way, all of the students could participate in RADEC learning. Before the students got their worksheets and questions about learning materials, teacher explained to their parents about RADEC learning model that brought a shared understanding and synergy between the teacher and the parents. The teacher played the facilitator role in the Read and Answer stages by giving the worksheets containing instructions, basic theories, questions, and answer columns. These resources had positive correlation with the results of the students learning and provided a safe environment for studying (Young dkk., 2003). Prior to applying RADEC, the teacher arranged and developed the worksheet in the Answer stage (Nurhayati et al., 2022).

Read and answer sections are typical in RADEC. They aim to build the foundation and concept of the knowledge related to the learning material in the classroom. On the other hand, tests in learning are to direct the students to acknowledge the most crucial parts of the learning materials (Pratama et al., 2019). The questions can improve reading habits as pre-learning,

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encourage students to read the main ideas of the course material, and help them get the best learning outcomes possible. A question section is a crucial component of learning because it helps to recreate the student's educational experience (Satria & Sopandi, 2019). Furthermore, students' pre-learning questions can be a medium for teachers to train various thinking skills (LOTS, MOTS, HOTS, critical, creative, and other thinking skills).

The pre-learning questions and distribution of the students worksheets have to be done at least a day before the online or offline learning process. With this gained conception, the students can demonstrate their engagement in the classroom by giving solid arguments, asking questions, and offering responses. The students' degree of participation can be judged by how they perform in the classroom while engaging in active learning, not by how much knowledge they take in passively (Gettinger & Seibert, 2002). The students' questions are essentially the results of a research process in the students' mind to learn more about a subject (Taboada & Guthrie, 2004). The RADEC learning model encourages students to show their best performances. Here, learning is not a rigorous process that binds students to the teacher's expectations. Providing students the opportunity to play an active role in the learning process is essential for the students' participation (Mascolo, 2009). Active participation can take the form of asking questions, giving opinions, or simply answering questions, basically interactions that occur in a various directions (Abdullah et al., 2012).

For the purpose of becoming an advanced country, collaborative skills are imperative in the 21st century skills, since Collaboration allows students to improve their social skills (Ginsburg-Block et al., 2006). In fact, collaboration skills are identified as an important learning outcome rather than simply a means to develop or assess knowledge (Kuhn, 2015; Lai, 2011). Thus, collaboration skills have grown increasingly significant in this era as a competency required in the 21<sup>st</sup> century, in addition to communication skills (Janssen et al., 2013).

According to the findings of this study, eight indicators of collaboration skills appeared on elementary students during the RADEC learning. Half of them got the maximum score (100), indicating that they can apply the collaboration skills. Collaboration demands that students work as individuals as well as groups to reach a conclusion and then create an innovation. It is consistent with the definition of collaboration that is to assign a task to work on and solve a problem together (Child & Shaw, 2015).

The panelists of the groups were motivated to work together to solve the questions in the learning process by discussing the invention that resulted in crossword puzzles, mind maps, and elastic wax art. This presentation was similar to the activities in the classroom. Collaboration enables students to solve every problem by effectively dividing the workload, combining separate information, increasing their creativity, and drawing solutions from their peers' suggestions. (OECD, 2017). In addition, collaboration skills will improve students' ability in areas such as problem solving and self-concept in academic settings. (Ginsburg-Block et al., 2006).

The RADEC learning model encourages students to be more active and makes it easier for teachers to meet the students' needs. According to the findings of the study, students are more likely to participate and collaborate when they ask questions, give opinions, deliver arguments, draw conclusions, and work on inventions. Other factors include the teacher's demand, having already read the passage, and feeling confident. A student who makes collaboration a habit will be more confident with their own abilities or will learn the skills required for collaborative activities (Hernandez, 2013). To master the 21<sup>st</sup> century skills, teacher can implement several teaching methods by considering the students' needs. The treatment in teaching varies depending on the teaching method, learning environment, and students' condition. Certainly, the method for elementary school will be different from the method for a college student. Elementary students need more attention and a more focused learning strategy (Daniel, 2020). Elementary school teachers' job is more complex since they do not only teach math, reading, and writing, but they also have to know their obstacle of studying, students' internalization, classroom controls, and develop the students' social skill (Brownell et al., 2009).

Constructivism theory suggests that people acquire knowledge and information based on their experiences (Bada & Olusegun, 2015). Reading activity in the *Read* stage becomes a pre-

construct to build a strong, fundamental concept. The understanding of this theory still attaches to pedagogy aspects. Moreover, it can help the students engage with the learning materials (Bada & Olusegun, 2015). In details, the constructivism in class during the RADEC learning was evident in; (1) interactive communication between students and the teacher based on their own knowledge, (2) the teacher's help for the students to construct their ideas (3) assessment upon assignments, observations, and test simulation, (4) dynamic knowledge based on experience, and (5) collaboration in a group.

## 6. Conclusion

This study found that several forms of students's participation and collaboration can be stimulated through RADEC learning as evidenced by the percentage and indicators of participation and collaboration abilities influenced by external (teacher motivation) and internal (students' self-confidence and reading activity) factors. This indicates that the RADEC learning model can be used as an alternative for teachers to train students' participation and collaboration skills. In addition, teacher encouragement is needed to cultivate both types of skills.

## Limitation

The limitations of this study include the limited time and research subjects, since it only involved one class with the duration of several meetings. Another limitation is the research scope, which only included participation and collaboration skills.

## Recommendation

Based on the limitations, further studies can be conducted for a longer period of time and involve many levels of students (lower grades and higher grades) with more diverse students to produce more varied and actual findings. Future studies can explore participation and collaboration, as well as other skills necessary in the 21<sup>st</sup> century.

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## Conflict of Interest

The researchers have no conflict of interest to declare. Elements in writing and publishing this study, especially in financial and personal interest that conflicted to the study, have been reported.

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