

## Improving primary school teachers' competence in teaching multi-literacy through RADEC-based training programs

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### Suggested Citation:

Imran, M. E., Sopandi, W., Mustafa, B. & Riyana, C. (2021). Improving primary school teachers' competence in teaching multi-literacy through RADEC-based training programs. *Cypriot Journal of Educational Science*. 16(6), 3033-3047. <https://doi.org/10.18844/cjes.v16i6.6494>

Received from August 23, 2021; revised from October 25, 2021; accepted from December 10, 2021.

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### Abstract

The purpose of this research is to improve the competence of teachers in teaching multi-literacy through a training programme based on the Read–Answer–Discuss–Explain–Create (RADEC) learning model. This descriptive qualitative study was conducted in a private primary school in Bandung, West Java, Indonesia. The participants included were a teacher and 29 students (17 male and 12 female students, with an average age of 11 years). Documentations, observations and interviews were used as data collection. The data were analysed quantitatively and through the Rasch model. The results show that mentoring during the implementation of the RADEC model can increase teachers' knowledge of multi-literacy learning and teachers' skills in planning and implementing the RADEC model. It can be concluded that the RADEC learning model contributes to a positive change in student learning, promotes 21st-century skills and includes multi-literacy skills. Thus, trainers can use the RADEC learning model to enhance teachers' ability in teaching multi-literacy.

Keywords: Multi-literacy, RADEC model, teachers' competence

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## 1. Introduction

Education is dynamic, which means it will adapt to the times and technological progress (Ennouamani et al., 2020; Ladachart, 2020; Ledger et al., 2015; Rumahlatu et al., 2021). It is very important for teachers to keep abreast of the latest information about education (Akbaba-Altun, 2004; Ebenezer et al., 2021; van Deursen et al., 2016). Nowadays, everyone (including teachers) can easily access technology-related information to search for information about strategies, models or any other aspect to promote a more effective and efficient learning process (Stein et al., 2020). This is a way for them to responsibly teach many skills that will benefit students' future.

In the learning process involving higher-level thinking skills, teachers must be able to guide students to meaningfully apply their basic literacy skills (Hanemann, 2015; Ihmeideh & Al-Maadadi, 2018; Kibirige & Mogofe, 2021), especially multi-literacy skills. The term multi-literacy is used to understand the complexity of various texts, in which visual, spatial, gesture and language elements are combined with a variety of communication modes that affect personal literacy practice (Cheong et al., 2018). The use of the term multi-literacy is to adapt to existing literacy conversions. These changes require efforts to find effective ways to integrate the old and new literature. Teaching and learning geared towards multi-literacy must be adapted to the competence framework of the 21st century. It is important to consider how students communicate and express their ideas based on the analysis of information from multiple sources and how to use the surrounding environment to enhance creativity (Bolanos & Salinas, 2021; Kirch, 2007). These ideas are related to students' critical thinking and problem-solving skills. Multi-literacy is now seen as a new form of educational ability (Henriksen et al., 2018; Trauth-Nare, 2016).

Therefore, students need to achieve the following multi-element literacy: (1) reading literacy, (2) scientific literacy, (3) technical literacy and (4) communication literacy. These four types of literacy are part of multi-literacy, and students are generally considered to acquire them by completing their studies and daily activities. For various reasons, issues related to multi-literacy are discussed in comparative terminology. First is the cultivation of multiple elements in the academic, scientific, technological and communication language. The cultivation of multiple elements can mediate each learning activity. Second, just as technology always advances, multi-literacy is not a static form of communication. Third, educators understand multi-literacy in order to promote multiple skills to complete activities based on relevant needs.

Multi-literacy learning cultivates students' understanding, critical thinking, creativity, communication skills and collaboration, which are hallmarks of 21st-century learning. Integrating literacy into multi-literacy learning will help students deal with complex learning problems and think collectively about the environment around them (Comber, 2016). It will be an intellectual tool and technique that can be used to build conceptual understanding, critical and creative thinking, collaboration and communication in the classroom learning process. Students use their multi-literacy skills to understand various problems and provide empirical evidence in critical investigations. In addition, they can use other forms of literacy, graphics, write summaries and explain to others.

Therefore, literacy skills are very beneficial not only for citizens as individuals but also as members of the society, allowing them to promote democracy and civilisation. This will allow everyone to develop their own skills and self-confidence to critically explain and analyse everyday situations and become skilled citizens of the 21st century. To support students' skills, it is necessary for teachers to form a habit, which will have a positive impact. This requires teachers to develop the ability to carry out multi-literacy teaching in the classroom. The knowledge to acquire literacy skills is already included in the existing curriculum. Since implementation in the classroom is a major factor affecting students' multi-literacy

skills, teachers must have the ability to develop these skills in teaching practice. Teachers are required to not only implement the curriculum, but also to develop, define and reinterpret it (Thompson, 1994). Therefore, the success of the curriculum reform mainly lies in the importance of teachers' ideas of this reform or innovation movement (Handal & Herrington, 2003). Unfortunately, the policymakers and education authorities responsible for this educational reform and launch still considered it a failure. Most innovations are introduced or established through a top-down approach without negotiation. Therefore, teachers must have a sufficient understanding and must know how to integrate various documents into their teaching practice when and where they are needed (Milton et al., 2007).

Several studies have shown that the knowledge, beliefs and experiences that teachers gain from the workshop of teacher competency development have a powerful impact on the development of new concepts and understandings (Covay Minor et al., 2016). This shows that teachers have responded positively to workshops aimed at improving diverse literacy teaching, despite the large gap between recent existing literacy practices and the teaching required by literacy reforms (Opfer et al., 2016). Another background factor indicates that the teaching background plays a key role in cultivating the capacity of teachers for its subsequent implementation and maintenance (Kraft & Papay, 2014). Reading shows that insufficient preparation time and insufficient material acquisition are common obstacles to implementing and maintaining teacher development. The goal is to integrate literacy into the teaching process. Despite the main obstacles, many empirical studies have shown that the development of teaching capacity continues to be beneficial for the reconstruction of teaching practice. There are several problems in Indonesia, such as the content of the courses is more intensive, the materials for each semester are strictly divided and the general exams scheduled (formative assessment, mid-term exam, final exam and national exam). These are all compliance situations that make teachers feel that the application of foreign innovative learning models is inappropriate.

The situation requires the development of innovative learning models adapted to Indonesian conditions. Indonesian teachers need an alternative to a contextually innovative learning model. One of the alternatives during the coaching period is the Read–Answer–Discuss–Explain–Create (RADEC) learning model. The RADEC learning model was originally introduced at an international conference in Kuala Lumpur, Malaysia. Considering the existing conditions in Indonesia, it can be used as a suitable learning model alternative (Sopandi, 2017). The RADEC learning model makes it possible for teachers to teach multi-literacy. By looking at its learning stage, the RADEC learning model may trigger the emergence of various literacies. Another factor is related to its simple and memorable stage of learning. As the name suggests, the sequence of these stages is reading, answering, discussing, explaining and creating, as presented in Table 1. The RADEC learning model also encourages students to actively participate in the learning process and provides them with a meaningful process. This concept is in line with the initial purpose of the development of this learning model, which is to overcome the problem of the low quality of the learning process and student results.

Table 1. Description of the learning process through the RADEC learning model and its relationship with multi-literacy skills

RADEC stage	Learning process	Multi-literacy skills
Read (R)	Students begin the learning process by reading information from various sources (printed and electronic) related to the topic they are learning that day.	It is possible at this stage to cultivate literacy in reading, information, technology and other disciplines, such as scientific literacy.

RADEC stage	Learning process	Multi-literacy skills
Answer (A)	Students answer pre-learning questions related to the basic cognitive aspects that they must master after learning the topic based on their own comprehension during the reading stage. These questions require students to apply low-level thinking skills to higher-level thinking skills. This 'answer' stage is done independently, without the help of others, and is completed outside of the classroom prior to face-to-face learning.	This stage is conducive to cultivating non-verbal communication literacy in the form of writing. If students demonstrate or report their answers through technology, this stage can also exercise technical literacy. It also promotes subject-related literacy, such as science literacy.
Discuss (D)	Students form groups (for example, each group consists of 24 students) to discuss the answers to the preview questions. At this stage, teachers play a role in determining the diversity of student needs.	Related to a variety of literacy learning, this stage cultivates the literacy ability of oral communication. If students use technology as an online meeting platform for discussion, it also supports technical literacy. Literacy related to disciplines, such as scientific literacy, is also promoted.
Explain (E)	At this stage, students elect representatives as speakers to show the results of their discussions on their respective topics and teachers as guarantors of the content. The teacher also guides students to refute, criticise and refine the speaker's explanation. Teachers can act as a source of information for the parts that the students are unclear or incompetent with.	This stage, like the 'discussion' stage, is conducive to training verbal communication skills. If students use technology to aid their interpretation, this stage also contributes to technical literacy. It can also promote discipline-related literacy, such as science literacy.
Create (C)	Students develop ideas and reach consensus in the form of problem formulation in problem-solving surveys and upcoming projects. Creativity must be consistent with the materials learned and suitable for daily life. Teachers use examples to motivate students to come up with creative ideas.	Like the 'discussion' and 'explain' stages, the 'create' stage has the potential to develop verbal communication skills. If students use technology when discussing plans, implementation and reporting, it can also promote technical literacy. This stage also exercises literacy related to the discipline, such as scientific literacy.

Previously published research attempted to use learning models such as discovery learning, problem-based learning models and project-based learning to improve the literacy rate of students (Habok & Nagy, 2016). However, research on this topic is primarily limited to efforts to increase certain literacy rates. Previous researchers did not discuss students' multi-literacy progress in detail.

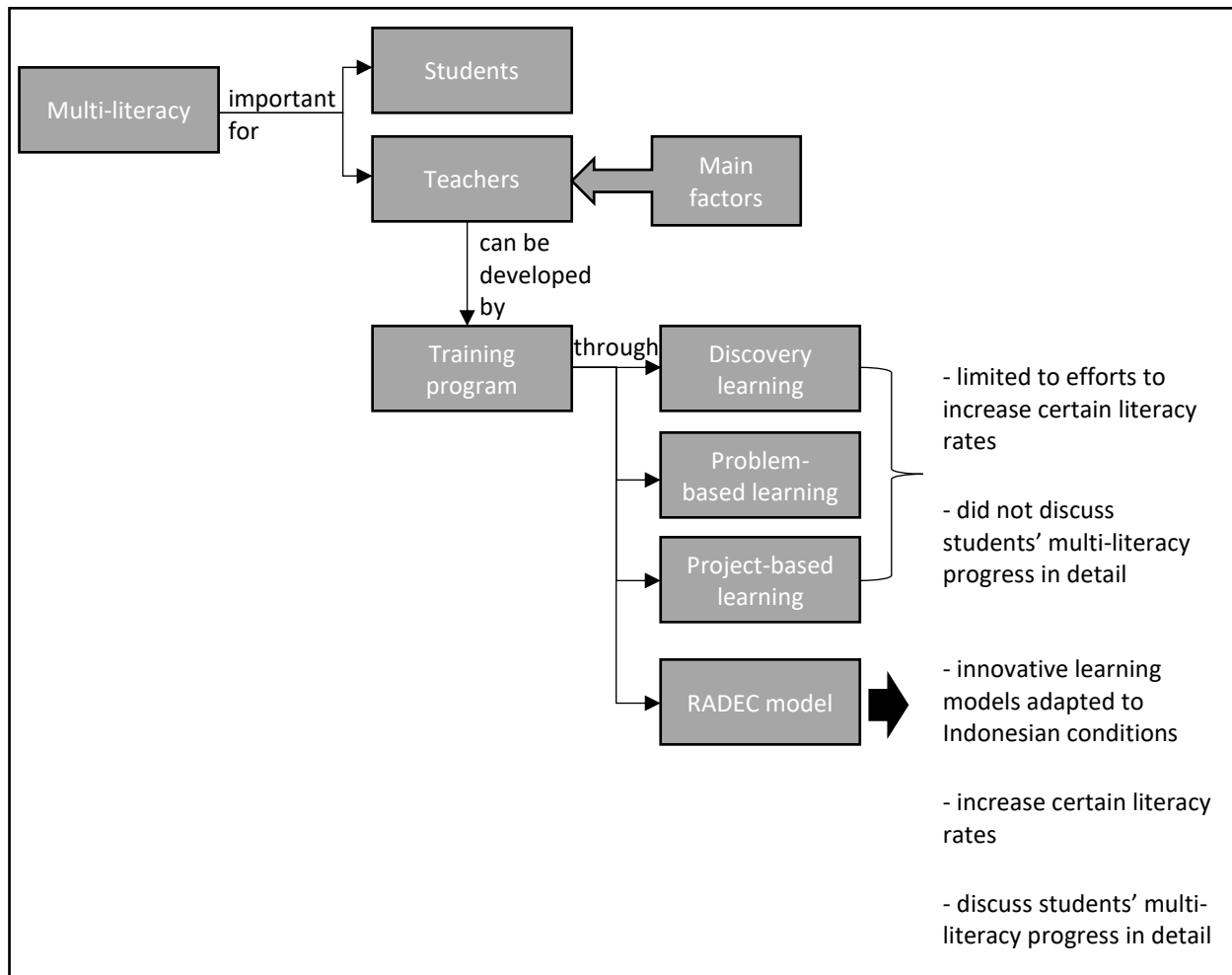


Figure 1. The framework of the research

In response to this emerging problem as Figure 1, this study aims to improve the competence of primary school teachers in teaching multi-literacy through a training programme based on the RADEC learning model.

## 2. Methods

### 2.1. Research design

This research used the descriptive qualitative research. Data were collected directly and in depth by researchers in the field. The data were collected through documents, observations and interviews to meet the objectives of the research. The mentoring activities of this research included the following: (1) Instruct teachers to prepare teaching plans and provide teachers with information related to multi-literacy learning, RADEC learning models and methods of integration of indicators; (2) Guide the implementation of the teaching plans; and (3) Evaluate the learning process.

## 2.2. Respondents

The main data source for this study is human beings, who are generally referred to as respondents. The respondents for this study are fifth-grade students and their teachers at a private primary school in Bandung, West Java, Indonesia, in 2019/2020. Bandung City is the largest metropolitan area of West Java, as well as being the capital of the province. The city is 140 km southeast of Jakarta (capital of Indonesia) and is the largest city in West Java, as shown in Figure 2. There were 29 participants in this study, including 17 male and 12 female students, with an average age of 11 years. At the same time, only one teacher participated in the study. The selection of respondents is carried out directly by the researcher to avoid possible obstacles, such as equipment availability.

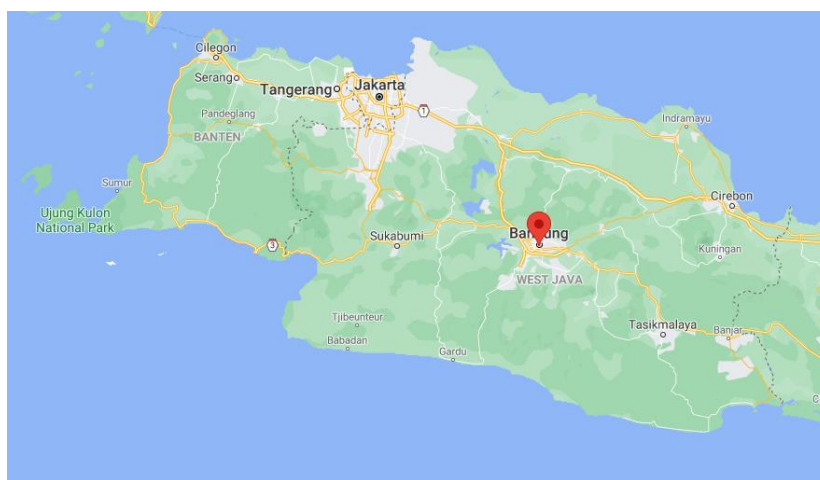


Figure 2. Map of Bandung, West Java, Indonesia.

(Source: <https://www.google.com/maps/place/Bandung,+Bandung+City,+West+Java>)

## 2.3. Data collection and analysis

Data were collected through documents, observations and in-depth interviews. Documents are used to enable investigators to view all activities as a whole from the beginning to the end of the investigation process. Observation allows researchers to describe the learning process in a more descriptive way, and also to find out the improvement through the observation sheet for 3 weeks. On the observation sheet, there are 1–4 scores for each item on the RADEC learning. The last procedure, the interview, aims to gain a deep understanding of the teachers' understanding of the RADEC learning model and student literacy. The data collection was validated by three experts. All data from documents, observations and in-depth interviews have been qualitatively analysed, and also used the Rasch Model. The Rasch model used is variable maps (wright maps) for the results of observations of teachers after using the RADEC learning model. The variable maps can describe the achievement of the RADEC stage for each week.

## 3. Result and discussion

This section presents the separation of mentoring activities.

### 3.1. Instruct teachers to prepare teaching plans and provide teachers with information related to multi-literacy learning, RADEC learning models and methods of integration of indicators

The teaching plan prepared by the teacher was reduced to one page in accordance with the instructions of the Ministry of Education. Guidance was provided on preparing the lesson plan for various meetings. By discussing the steps and adjusting the learning materials, the orientation was completed in four meetings. The integration of multi-literacy into the lesson plan is shown in Table 2.

Table 2. Integration of multi-literacy into the lesson plan

No.	Time (week)	Multi-literacy			
		Reading	Science	Technology	Communication
1.	1	√	√	-	-
2.	2	√	√	-	√
3.	3	√	√	√	√

In the first week of tutoring, the teacher was shown information about multi-literacy learning and the RADEC model. The first task the teacher must do is to use the RADEC model to create a lesson plan with multi-literacy skills. In the first week, the teacher found it difficult to match the subject material with the multi-literacy learning within the RADEC framework. It was not easy for her to write a one-page lesson plan. At this stage, researchers noticed that teachers' ability to construct multi-literacy learning scenarios was still low; learning activities only focussed on certain literacies. Technical literacy and scientific literacy are not optimally included. The second week of tutoring is basically similar to the first week of tutoring. The researchers made sure that teachers had enough information about multi-literacy learning and the RADEC learning model. Teachers also developed a curriculum that integrated multi-literacy within the RADEC framework. Teachers used the RADEC framework to better adjust the subject's curriculum to include multi-literacy. The teacher also successfully reduced the lesson plan to one page. At this stage, teachers had good ability to plan learning scenarios that included multi-literacy. The learning activities successfully integrated multi-literacy learning. However, these activities did not take into account the active participation of students in learning technical literacy. In the third week, teachers still received information about multi-literacy learning and the RADEC learning model. The same process also happened, in which teachers were asked to use the RADEC model to develop a curriculum plan that integrated multi-literacy learning. The teacher successfully combined thematic lessons, multi-literacy and the RADEC model in a harmonious way, and prepared a one-page lesson plan. According to the teaching plan prepared by the teacher at this stage, it can be said that their ability to create multi-literacy learning scenarios is very good. Learning activities reflect the learning of multiple elements, such as reading literacy, scientific literacy, technical literacy and communication literacy.

During the instructional process, the teacher received sufficient assistance to understand the RADEC learning model. This can be seen when teachers attempt to create lesson plans that incorporate multi-literacy into the RADEC learning model. Although the teacher faced the challenge of integrating multi-literacy within the RADEC framework by developing the lesson plan in the first week, she was able to fine-tune it and come up with a good lesson plan in the next few weeks. The orientation during the preparation of the curricular plan within the RADEC framework is to promote the correct learning model of 21st-century skills. The existing stages in the RADEC framework encourage students to do many activities and to improve their abilities and skills, such as discussion, problem-solving, reading etc. (Septinaningrum et al., 2020). On the other hand, by acquiring multi-literacy skills, students are

expected to be able to solve daily problems in the school and the surrounding environment. The multi-literacy skills that have been integrated into the lesson plan can also be used as a reference for teachers in the learning process to improve students' abilities, not only in behaviour and knowledge, but also multi-literacy skills.

### 3.2. Guide the implementation of teaching plans

Then after the lesson plan became simple, the teacher updated it in class. In the implementation process, the teacher was supervised in the teaching and learning process to understand her level of understanding of using the RADEC learning model to teach multi-literacy. In the first week, referring to the results of classroom observations, it was found that the teacher still had the habit of explaining conceptual problems. Teachers often reinforce by reinterpreting the topics learned at the end of the learning process. Teachers post questions to check students' understanding and abilities. In the preview activity, some students did not answer the previous day's questions. This problem arises because most students are not used to using technology (digital tools and online media) to search for information, whether it is general information related to the subjects they learned in school. This is also related to the student's lack of tendency to complete homework at home. During the discussion (Figure 3), the students were very passive, with no information or exchange of opinions. At the same time, when discussing the use of digital tools, the students were very enthusiastic, although the use of the tools was still personal. Another problem is that students do not seem to be confident enough when presenting the results of the discussion before class. There were no rebuttals or issues related to the content posted by the team representatives. In the 'create' stage, students still needed guidance to generate creativity in creating simple works related to the subject they had learned. At the end of the learning process, an assessment related to the learning process was carried out. Feedback and suggestions were provided to improve the next learning process. The interview data showed that in the first week, teachers still had difficulty implementing the RADEC learning model. This is due to a lack of understanding of the corresponding model. The information and socialisation of the RADEC learning model were still limited to her. In that week, the students' learning process was not so satisfying. The teacher received comments related to the RADEC stage that she did not fully understand. Teaching methods, such as master classes, were held frequently, and the evaluation of students became the focus of improvement the next meeting. In the interview, the teacher said: 'When I apply the RADEC model, I can see the difference compared with other models. In other models, 70% of the learning materials are provided by teachers and 30% are processed by the students themselves in the RADEC learning model, students are more active in finding information on their own and need time to adjust'.



Figure 3. Teacher guides students in group discussion



The observation of the second week during the implementation of the RADEC learning model marked a change. The students responded better to the pre-learning questions. Before the learning process, a letter was sent to parents to support students in pre-learning activities at home. The preparatory questions guided students to read relevant information from various sources and use digital tools before completing assignments. Students can provide picture evidence or other relevant information to support their answers. The teacher instructed students to bring their own laptops to study the day before. Students were asked to make a PowerPoint presentation to show the results of their homework. In the discussion during the PowerPoint creation process, students actively shared information and ideas with their peers. Some students searched for information, while others focused on editing PowerPoint screens. The next day, the teacher posted a pre-learning question and asked the students to answer at home. As the day before, students could attach evidence to support their answers. This means that the 'read' stage was carried out by the students at home. Among the pre-learning questions, there was another question that required students to design or create a simple project idea related to the topic they have learned. In addition to these questions, there are also some examples of ideas or jobs that can inspire students to design the jobs they will produce. During the discussion, it was easier for students to answer questions because each member of the group had a lot of information. However, some groups still passively shared and brainstormed their responses. In the 'explain' or demonstration stage, the teacher asked each group representative to come to the front of the class and explain their answers in detail, as shown in Figure 4.



Figure 4. Student presents the result of the group discussion

During the presentation, there was no discussion related to the responses of the group representatives. The other groups did not refute or question the responses of the presenting group. The teacher still responds or draws conclusions to the responses of representative students. In the 'create' stage, almost all students have completed a project design in the preview activity. Some students write poems, sculpt statues, and draw pictures, so that the works displayed by each group are no longer discussed. Then, the teacher conducts the assessment by asking the students to review what they have learned. At the end of the learning process, the teacher evaluated her teaching process and received some feedback to improve the next teaching practice. In the second week, several comments were made on the students' preview questions and simple project assignments. With reference to the interview of the second week, the teacher has become accustomed to the implementation of the RADEC learning model. Teachers who feel difficult at first can slowly master it and apply it as an effective learning model. In the second week, the teacher mentioned that the students are beginning to reach

the goal of successful learners, which can be seen in the students' active attempts to read from various sources and answer preschool questions. In addition, the teacher said that although the 'Explain' stage has not yet reached the highest level, the students' discussions went smoothly. This shows that it is difficult for some students to take turns speaking, so they speak at the same time. At the same time, in the 'create' stage, the students have not done well. The teacher is already familiar with the implementation of RADEC. However, she still gave too many explanations on the subject. Therefore, avoid excessive lectures or explanations from teachers as part of the assessment, which may encourage students to learn independently.

The observation results of the implementation of the RADEC learning model in the third week showed a good conversion. Students do a good job of preparatory questions, allowing them to find information from a variety of sources and use digital tools before answering the questions. Students add relevant evidence in the form of pictures or other relevant information to support their answers. The teacher also asks the students to design a simple project related to the topic they are learning. This means that the 'read' phase is completed at home. A question in the pre-learning step requires students to design or create an idea for a simple project work based on their respective topics. These questions also contain some examples of ideas or works that can inspire students to design their own works.

In the discussion process, it seems easier for students to complete the question, because each member of the group had their own part to complete. The quiet and passive group last week was able to discuss at this stage. In the interpretation or presentation stage, the teacher asks a representative of each group to present their discussion results in front of the class. During the submission process, you responded to the submitted content. Other groups refuted or asked questions about the speaker's responses. The teacher no longer provides answers or conclusions related to the presentation. Instead, he offered opportunities to other students who had different answers to the questions.

In the 'Create' phase, almost all students designed the project assignments assigned in the preview activity. Some students made images and videos so that there would be no discussion about their work. After all the students present their work in front of the class, the teacher conducts the assessment by asking the students to recheck the learning materials. According to the interview in the third week, the teacher has become accustomed to the RADEC learning model. This may be due to the tutoring activities conducted by the researchers in each meeting, allowing the teacher to understand the model step by step. Teachers also realised that this model is suitable and can improve students' multi-literacy skills. In an interview, the teacher mentioned that students are encouraged to read more of the resources in the RADEC framework, which strengthened their good responses to the preliminary questions. In addition, teachers recognised that the implementation of the model had significantly accelerated the active participation of students in the learning process. Student participation can be seen in all stages of RADEC. In the 'Read' stage, students are very interested in finding information related to pre-learning topics. Students read information from a variety of relevant sources, allowing them to complete the 'answer' stage well. In the 'discuss' stage, the students shared and exchanged their responses appropriately. The results of this 'Discuss' stage are then carried over to the 'explain' stage, where students elaborate the results of the discussion. In the 'create' stage, students can create excellent work in a variety of forms, such as pictures and videos, as shown in Figure 5.



Figure 5. Students manufacture a simple oven in the 'create' stage

In the implementation phase, guidance played a key role in instructing teachers to teach multi-literacy in an acceptable way (Fterniati & Spinthourakis, 2004; Hung et al., 2009; Joncas & Pilote, 2021). The teaching and activities performed by the tutor during the tutoring period are dedicated to promoting the diverse literacy skills of the students. Based on reading literacy, scientific literacy, technical literacy and communication literacy, the students carried out a series of literacy activities. The application of the RADEC model during the multi-literacy learning period demonstrated this point, and the model worked effectively during the training period. The stages of the RADEC model implemented by students and teachers allow a multi-literacy learning process to take place. Students develop the habit of reading information from various sources, using various technologies, and communicating with family and friends to complete pre-learning problems. During the 3 weeks of tutoring, the students also had discussions. This helped students improve their communication literacy, scientific literacy and technology literacy. This occurred during the 'explain' and 'create' stages, and students developed a habit of multi-literacy activities (Hung et al., 2009).

### 3.3. Evaluation of the learning process

During the 3 weeks of tutoring, the teacher's learning methods had undergone many changes. In the last week of tutoring, teachers could fully implement the RADEC learning model in multi-literacy teaching. Figure 6 shows the results of observations of teachers after using the RADEC learning model from the first to the third week.

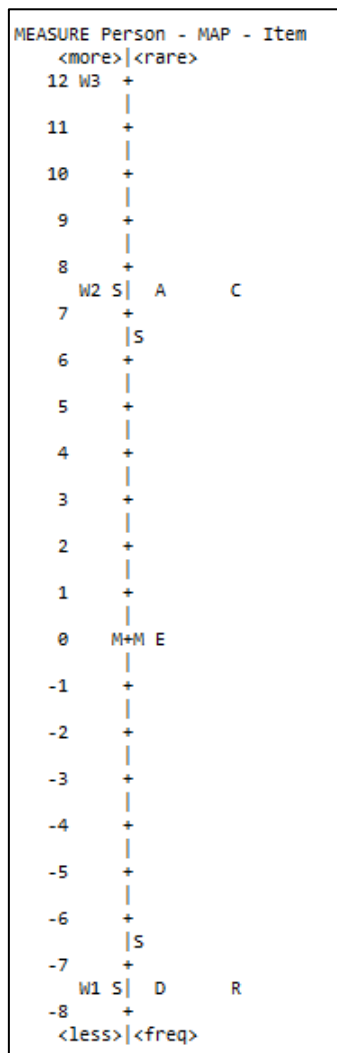


Figure 6. Results of the observations of teachers after using the RADEC learning model

Figure 6 shows that in the first week the process can be achieved only in the 'Read' and 'Discussion' stages, while in the second week, all stages in RADEC can be carried out well, but it is still not optimal at the 'Answer' and 'Create' stages. In the third week, all stages of RADEC are carried out well, by both teachers and students. There is an improvement in teacher competence in using the RADEC learning model. All stages can be carried out well in the third week.

The RADEC learning model has become one of the models that motivate students to actively participate in the learning process, especially in the Indonesian language environment. This is because the model has been adjusted to the Indonesian national educational goals. Some researchers noted that the RADEC learning model is based on national educational objectives (Pratama et al., 2019; Septinaningrum et al., 2020). This learning model tries to build and develop the potential of students. This concept is based on what Vygotsky mentioned in Kirch (2014) and Pratama et al. (2019). One of the factors that affect the development of students' knowledge is their interaction with the social environment. This vision should be implemented as one of the key elements in the learning process

because Indonesia is widely known for its strong social interactions. The meaning of social interaction becomes the basis of this research to optimise the interaction of students in the RADEC learning model.

#### 4. Conclusion and recommendation

Within the framework of RADEC, teachers who instruct and teach multi-literacy assist in the learning process, accelerate the quality of the teaching and learning process, enhance student enthusiasm and promote diverse literacy learning. There is an improvement in teacher competence in using the RADEC learning model. All stages can be carried out well in the third week.

With reference to the results and discussions mentioned above, it can be concluded that the RADEC learning model can increase teachers' knowledge of multi-literacy learning and skills in planning and implementing the RADEC model. The RADEC learning model contributes to the positive transformation of student learning. These positive effects are to encourage students to retrieve a lot of information on relevant learning topics. Every argument and information provided by students can be shown to be reasonable, and communication between students is also improved. Students can create topics related to learning and are more creative in terms of simple tools. In addition, the RADEC learning model promotes 21st-century skills and includes multi-literacy skills. Thus, trainers can use the RADEC model to enhance teachers' ability in teaching multi-literacy.

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