



The development of social interaction for early childhood in Lampang province by using virtual reality application

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Abstract

The aim of this research was to develop social interaction for early childhood children in Lampang province, Thailand by using virtual reality technology. The population in this study was early childhood children from 355 schools in Lampang province, under the jurisdiction of Lampang Primary Educational Service Area 1, 2, and 3. The sample group consisted of sixty early childhood children who were selected by purposive selection. The research tools the application of Lampang learning resources and the early childhood social development evaluation form. The results were statistically analysed for percentages in the form of descriptive narrative. The results showed that the overall social development of the sample group was at the highest level or 76.58% with an average value of 4.53. Also, the results presented that the sample group was able to follow the rules and the agreements of the learning resources appropriately, give comments and answer the questions of the instructors. This was a result of using the VRLampang application which could be divided into three parts: 1) regulations and guidelines of the learning resources 2) information of ten Lampang learning resources 3) the efficient learning content activities appropriate for students.

Keywords: Early childhood, Imagineering model, Learning resources, Simulation, Social interaction, Virtual reality.

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Ethical: This study followed all ethical practices during writing.

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Contribution of this paper to the literature

This study was originally done during COVID-19 crisis. The situation that various countries around the World including Thailand have never been confronted before. This affects education at all levels particularly the social development of early childhood children online study. Hopefully, the VRLampang application in this study can be a solution.

1. Introduction

In Thailand, early childhood education covers children from birth to 6 years old. The learning material of Thai curriculum was defined in the experience and assessment of a child's development in four areas: physical, emotional-mental, social and intellectual. Technology and learning resources were integrated that were appropriate for the child's age and interests, taking into account children's real-life experiences and environments—(1) the child's family, (2) the person and place around the child, (3) the surrounding nature, and (4) the things around the child—enabling children to act, learn through the five senses, move, explore, play, observe, experiment and solve problems on their own and to interact with a variety of media and learning resources within their way of life—in accordance with the social and cultural contexts surrounding the child (Ministry of Education, 2017).

Outdoor activities and learning sources help children convert theoretical knowledge into practice. Particularly, preschool students can record all this knowledge into their long-term memory that stimulates all their senses. Improving their perception skills, language, social skills, emotion and child mobility. Yildirim and Akamca (2017) For example, in several Scandinavian countries, children spend half a day studying outdoors (Gray, 2018). In Thailand, learning resources are included in the National Education Act, which requires the government to promote and establish learning resources of all kinds. Libraries, museums, art galleries, zoos, parks, botanical gardens, educational parks in various disciplines, and sports and recreation centres provide sufficient resources for learners to seek knowledge or participate in activities. They enable learners to gain sufficient practical information, knowledge or experience.

The COVID-19 epidemic has necessitated social-distancing measures worldwide. City lockdowns and the subsequent shutdown of educational institutions, leading to distance learning management, are imposed to reduce the risk of transmission in school grounds and on the way to and from school (Rao & Fisher, 2021) When access to learning resources is limited, technology plays an urgent role to play in today's education, providing various digital platforms to prevent learners from attending classes. Teachers give lectures using various electronic modes using electronic device rather than classroom attendance (Abu-Rabba, Al-Mughrabib, & Al-Awidi, 2021). The United Nations Educational, Scientific and Cultural Organisation (UNESCO) report found that 90 per cent of students around the world have been affected by the closure of institutions. To clarify, children study online at homes they have no chance to interact with their classmates. They normally stay alone playing mobile phone. Also, children do not have excursion activities during online study. This impact is not only on school or university but also on parents. This is because they need to teach their children homework after coming back from work. Thus, the COVID-19 epidemic could be a factor in the accelerating progress of educational technology (UNESCO, 2021).

Therefore, Virtual Reality (VR) technology can be the solution of these weak points of online study. The technology has the potential to revolutionise education for both online and onsite because students can be simulated themselves in learning context more than any other available media (Gadelha, 2018). To clarify, Virtual Reality (VR) is deeply connected to the content students are learning in an unprecedented way. This is used to develop as teaching materials from kindergarten to university (Bdiwi, de Runz, Faiz, & Ali-Cherif, 2019). The use of Virtual Reality (VR) technology for early childhood education is highly appropriate, as children are unable to think abstractly (Kusuma, Wirawan, & Arthana, 2018). Learners have the experience to get closer to what they learn or places they are not able to visit in the real world, such as space, the deep sea, the inside of a volcano or the North Pole (Blyth, 2018).

The research team interviewed representatives, administrators, teachers and supervisors in Lampang Province. The team found that school closures prevented students from accessing learning resources inside and outside the school. It was also found that digital learning resources were insufficient for students' access, and teachers still had less production of digital learning resources, which take time to develop. Moreover, Putri et al. (2020) said that it takes time to develop the electronic resources. This fully causes students lack of experience in studying from existing learning resources.

Based on the above discussed reasons and their significance, the research team realises the importance of using technology to develop the Virtual Reality Application to simulate learning resources for early childhood in Lampang Province. This will increase the quality of educational management of educational institutions.

2. Research Objectives

To develop social interaction for early childhood in Lampang province by using Virtual Reality Application.

3. Research Questions

1. How social interaction of early childhood in Lampang province can be developed?
2. How Virtual Reality (VR) application can be developed to stimulate social interaction of early childhood in Lampang Province?

4. Literature Review

4.1. The areas of using Virtual Reality Technology with Children

The introduction of VR technology to children will focus on two areas: medicine and education (Kamińska et al., 2019; Maloney, Freeman, & Robb, 2020).

In medicine, Loiacono et al. (2018) created a virtual multiplayer game for children with neurodevelopmental disorders (Chang et al., 2020; Loiacono et al., 2018) assessed the effect of VR rehabilitation combined with

conventional occupational therapy on upper limb function and assistance to caregivers of children with movement disorders; Chang et al. (2020) and Tennant et al. (2021) used augmented reality technology to reduce anxiety and enhance readiness for paediatric patients undergoing radiation therapy (Tennant et al., 2021).

In education, it is a tool to help children develop cognitive skills and intellectual ability. For example, Ward, Freitas, Hendry, and Arndt (2020) created a computer model for learning about Arctic climate change. Araiza-Alba et al. investigated the potential of VR using 360-degree video as a tool to teach children aged 10–12 years old water-safety skills. Araiza-Alba, Keane, Chen, and Kaufman (2021) studied game development in a model of a VR application to develop the problem-solving skills of children aged 7–9 years old. They found that children were able to solve situational problems and transfer this knowledge to people around themselves (Araiza-Alba et al., 2021). Dahl, Fjortoft, and Landmark (2020) developed a VR application for learning first aid for preschool to high school learners (Dahl et al., 2020). Additionally, Reimers et al. studied a VR application to integrate learning with home activities, such as bath time, cooking or other household chores, for caregivers of children and those under 5 years of age (Reimers, Schleicher, Saavedra, & Tuominen, 2020).

4.2. Social Interaction of Children Aged 3–6 Years in Thailand

The ‘social development’ of children aged 3–6 years refers to how these children learn behaviours that are accepted or desired by society. Schools must encourage children to interact with people and their environment in daily life, participating in activities with others—adults, children of the same or different age, same-sex or heterosexual people—regularly. Social interaction should be encouraged for early childhood. Examples are self-help in daily routines according to age; independent play; group play, with others joining the conversation and exchanging ideas; role-playing; sharing; using language to express needs; behaving according to local culture and Thai traditions; local excursion; and taking responsibility for environmental protection both inside and outside the school. Each activity for the child each day should last about 10–20 minutes but this can be flexible according to the needs and interests of the child (Ministry of Education, 2017). When the child learns social behaviour, his or her social interaction will be adjusted according to learning experience. If the child learns social experience well, the child will have a good social interaction and be able to adapt to society in the right way.

4.3. Educational Learning Resources

Resources that provide knowledge and learning experiences to learners—both natural and artificial, including those in the community, lifestyle activities, religious activities, traditions and information resources—can be categorised into five types: (1) natural resource learning resources, (2) personal learning resources, (3) information learning resources, (4) location learning resources and (5) social activity learning (Wannapiroon, Nilsook, Kaewrattanaapat, Wannapiroon, & Supa, 2021). Having up-to-date learning resources is essential, but, most important, learners must know and understand how to use such learning resource to achieve the desired goals. Therefore, there must be guidance on the use of learning resources, leading to learning outcomes that are desirable, as each client has different basic skills and experience in using learning resources. The application of modern media and technology to facilitate access to learning resources is also important, with provision for access to learning resources anywhere, anytime to motivate learners to continue learning.

4.4. Imagineering on Virtual Reality for Social Skill

‘Imagineering’ or ‘Imaginary engineering learning’, is a conceptual process from Walt Disney, combining the imagination and engineering techniques to discover solutions or create works from abstract ideas or fantasies to become tangible inventions and innovations (Nilsook & Wannapiroon, 2013). Imaginary engineering learning can be applied to teaching and learning at all educational levels because imagination can occur at all levels of learning from kindergarten to working adults. The steps are: (1) imagination, (2) design, (3) development, (4) illustration, (5) improvement and (6) evaluation (Nilsook, Utakrit, & Clayden, 2014).

5. Methodology

5.1. Participants

5.1.1. Populations

The population is comprised of early childhood children who are attending 355 schools in Lampang Province under the Lampang Primary Educational Service Area, Offices 1, 2, and 3.

5.1.2. Sample Group

The sample group consisted of 60 early childhood children attending 3 schools in Lampang Province. They were selected by multistage random sampling process from schools with early childhood children in Lampang Province under 3 offices of Lampang Primary Educational Service Area. The Lampang Primary Educational Service Area then chosen as a random sampling unit using the cluster sampling method. The Office of Lampang Primary Educational Service Area 1 was the outcome. Then, considering of a large school with computer lab facilities and at least 2 teachers or support staffs for each room who help the usage of the application. 3 school were chosen, and 60 early childhood children were chosen by simple random sampling.

5.2. Scope of Content

The researcher aims to develop the social learning skills of early childhood children by using the VRLampang application. The contents of the learning resources are defined as follows: 1) Learning resources within the framework of the local curriculum development in Lampang Province 2) Registered community learning resources with the school and consider selecting 10 learning centers that can create a simulated environment, along with detailing the contents of each center with 3–5 key points.

This research uses ‘Imagineering’ in its application development model involving six steps: (1) imagination, (2) design, (3) development, (4) illustration, (5) improvement and (6) evaluation. (see Figure 1).

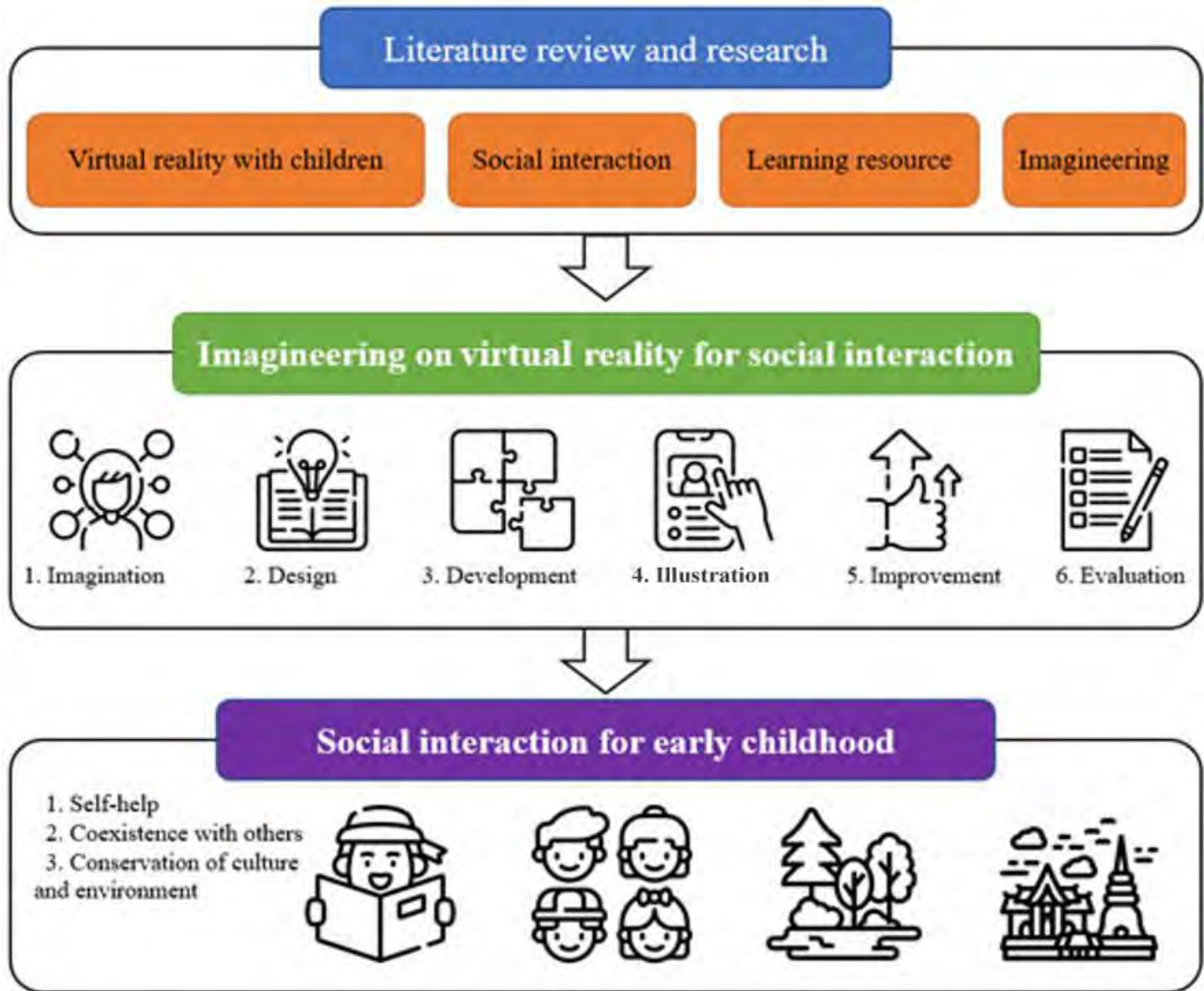


Figure 1. Imagineering process.

5.3. Research Tools

The VRLampang application was developed using VR technology consisting of instructions and 10 learning resources. The problem situation where children can bring themselves into the learning resource is used through of an Android mobile phone in combination with a Virtual Reality device (headset), which is designed and developed according to the ‘Imaginary engineering learning’. The assessment form for early childhood is characterised by 10 items rated on a scale of four (a rating of 4 means very good practice, 3 means good practice, 2 means fair practice and 1 means improve) and the assessment form was validated by three people with an index of item objective congruence (IOC) value greater than 0.50, and a reliability value of 0.91. The evaluation form is shown in Table 1.

Table 1. The evaluation lists of early childhood social interaction development.

No.	Assessment list	Practice level			
		4	3	2	1
1	Students can comply with the terms of the application				
2	Students use devices and applications safely				
3	Students can share the device with their peers				
4	Students behave as leaders and followers appropriately				
5	Students can talk to adults or familiar people about the resources				
6	Students can tell them where they are interested				
7	Students can tell you the importance of learning resources				
8	Students can discuss short sentences about the resources				
9	Students can speak, comment or answer questions about the learning resources				
10	Students have the etiquette of listening and speaking				

5.4. Ethical Approval

The present study is approved. The certificate number of permission is E2653-033, and it was issued by the Nakhon Ratchasima Rajabhat University Human Ethics Committee for Ethical Considerations Involved in Research on Human.

5.5. Data Collection

The research team collected data by creating an application-integrated experience plan and then organising activities for early childhood children using VR devices and 10 learning resources. The team observed the behaviour of the children and recorded data using the social interaction assessment form.

5.6. Data Analysis

The results of the early childhood social development assessment were analysed for percentages and descriptive narratives based on the interpretation criteria of the scores. The following criteria were used to interpret mean values:

70%–100% = Students have the highest level of social development.

60%–69% = Students have a high level of social development.

50%–59% = Students have moderate social development.

25%–49% = Students have low levels of social development.

Below 24% = Students have the least level of social development.

6. Results

6.1. Implementation of User Interface

The VR Lampung application was evaluated for its effectiveness by three experts: media and technology specialists, early childhood education specialists and early childhood education supervisors. The overall performance evaluation was excellent, with an average value of 4.53. A functional test involved 10 kindergarten learners at Lampung Rajabhat University Demonstration School. In this test, the learner saw the start screen before the main menu. The screen was designed in the form of graphics on the learning environment in Lampung Province. Before the main menu, there is an introduction screen; a screen of rules, or regulations, for the visiting learning resources, with a cartoon named Kati as a knowledgeable person (see Figure 2). The main screen consists of the ‘Introduction’ button, which displays the rules, or regulations, for visiting the learning resources, the ‘Start VR’ button, which provides access to the resources page; and the ‘Information’ button, which displays basic information about the resources available in the application (see Figure 3).



Figure 2. Cartoon character in the VR Lampung application



Figure 3. Home screen of the VR Lampung application.

The ‘Start VR’ button enables a display menu—marked with different numbers and colours (see Figure 4)—of the 10 learning resources, which are: (1) Wat Pong Sanuk Nuea, (2) Wat Phra That Lampung Luang, (3) Wat Phra Kaew Don Tao, (4) Wat Chedi Sao Lang, (5) the Thai Elephant Conservation Center, (6) Dhanabadee Museum, (7) Chae Son National Park, (8) Kad Kong Ta, (9) Ban Sao Nak Lampung and (10) Mae Moh Mining Museum. There are five to eight key points in each learning centre, 360-degree-view photos and audio narrations that stimulate communication and perception. Students can change their position by pressing the red button with numbers in a sequence (see Figure 5).



Figure 4. Learning resources menu screen in the VR Lampung application.



Figure 5. The key points of learning resources VR Lampung application.

There are activities for learners to complete missions in each learning centre. For example, students need to find a treasure box. After that they need to focus on the box then a heart shape will be popup, and there will be an audio narrative. However, the students need to remember the information from the audio narrative. After using the application, students must report what they have learned from the box to their teacher. If they report correctly, they will receive a heart-shaped sticker. (See Figure 6).

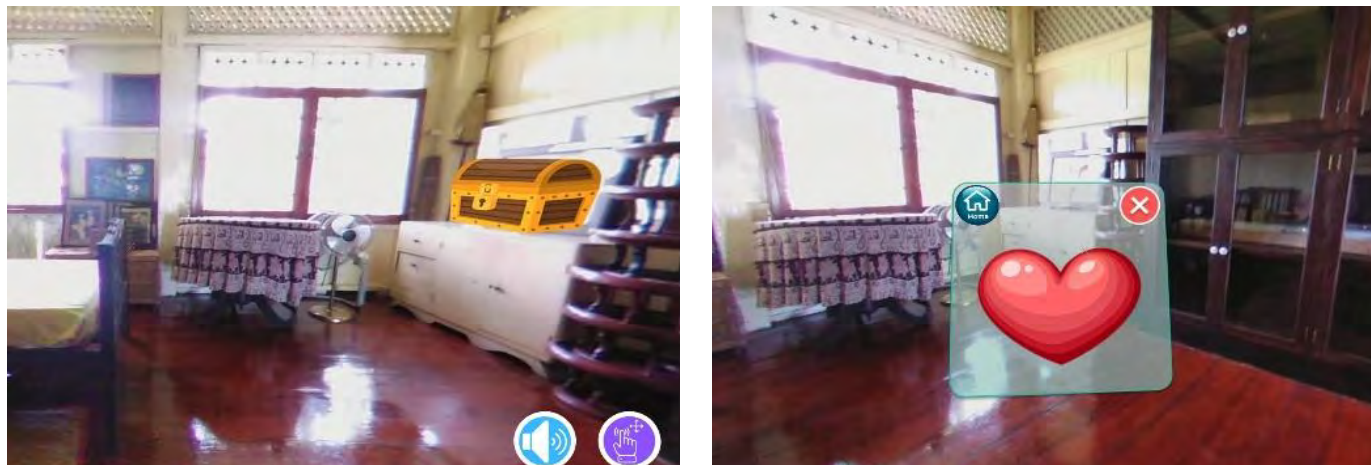


Figure 6. The activities for learners to complete missions in each learning center.

6.2. Results of Promoting the Social interaction of Early Childhood

Here, we present the results of the assessment of the interaction of children in early childhood education after using the application to simulate learning resources in Lampung Province. The results shown that 49 third-grade early childhood had the highest level of social interaction with 81.67%. Additionally, 11 third-grade early childhood had the high level of social interaction with 18.33%. However, the total average percentage was 76.58. The details are presented in Table 2.

Table 2. Results of promoting the social interaction of early childhood.

Percentage range	Social development level	Number of students	Percentage
70%–100%	Highest	49	81.67
60%–69%	High	11	18.33
50%–59%	Moderate	–	0.00
25%–49%	Low	–	0.00
Below 24%	Least	–	0.00
Total		60	100.00
Average			76.58

Additionally, the research team and teachers asked students asked to reflect on what they learned from the VRLampung application. The following items are the results of students' observed behaviour.

- Here are many attractions, but I have not been to them (Student 1).
- When I go to different places, I do not make noise to disturb others and do not write places (Student 2).
- I had so much fun, gaining knowledge and having a treasure chest to keep hearts (Student 3).
- I want my parents to take me on a trip (Student 4).
- I will help keep it clean that there may be a place of beauty (Student 5).
- I've been traveling with my parents in some places, but some points cannot enter (Student 6).
- I felt like I was there during my use' (Student 7).
- I answered the teacher's question, and I got a heart-shaped sticker just like in the app (Student 8).

7. Conclusion and Discussion

VR Lampung application was developed through the Imagineering Model process. Learners are interested in using the application; especially the process of imagination, turning the abstract imaginations of those involved in the research into concrete innovations (Chytry, 2012; Nilsook et al., 2014) The design focuses on simplicity, easy to understand, and has clear navigation in line with Aljojo et al. (2019) who studied the development of Arabic applications for children. It focuses on a simple design and easy navigation. The application is divided into three parts:

Regulations, guidelines, and usage of learning resources. An animation named Kati was used to explain knowledge and connect the story of the learning source through movement and sound. In accordance with Hoffmann, Christmann, and Bleser (2017) explaining content with animated cartoons for students will make children interested in learning more.

Virtual technology. It consists of 10 learning resources in Lampung Province that are interesting because children can stimulate their actual situations in those learning resources. These environments provide opportunities for individual learning. The researcher found that good media that make students interested and able to learn from real situations are still images, 360-degree photos, 3D images, text, animation, sound, and video as Wang (2018) noted, media displayed through augmented reality within applications must be a medium that contains both messages and clear picture with movement, color, sound, and video.

Activities for students to participate in the content of the learning resources that have been prepared by doing the assigned tasks. When they complete the mission, they will receive rewards. As a means of reinforcing and reassuring children, this is consistent with Puig et al. (2020) and Kraveva (2017) who use verbal reinforcement and rewards to build confidence and encourage learners to participate in activities that enhance teaching and learning goals (Behnamnia, Kamsin, Ismail, & Hayati, 2020) by prompting as soon as learners demonstrate behaviors consistent with the teaching goals.

Duration of use of the application. The researcher set the time for students to use not more than 20 minutes, in line with Mak (2022) which suggested that each application should not last longer than 20 minutes, and there should be a break from using for a while or for 1 hour, if desired to continue learning (Kelly, Graham, Bronfman, &

Garton, 2022) to prevent screen sticking and tiredness of the eyes, and the use must be in a spacious place. If many children use the application at once, there should be a space between them of at least 1-2 meters, and they must be closely supervised by a teacher.

The results of the assessment of social development of early childhood children after using the learning center simulation application in Lampung Province showed that early childhood children had social development at the highest level with an average percentage of 76.58. Assessments of most children showed a high level of development. It is because the application promotes development in all 4 areas—physical, emotional-mental, social, and intellectual—which children can interact with immediately, understand social situations, be able to communicate in response to them, and foster social coexistence. According to Papadakis, Kalogiannakis, and Zaranis (2021) the use of the application by the learner will help children understand the agreement or sequence of learning resources, identify learning resources of interest, and respond to social and environmental situations nearby (Choolarb, Premsmith, & Wannapiroon, 2019).

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