



The Comparison on 21st Century Skills of Early Childhood in Four Schools in Yogyakarta

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Abstract

Purpose – This study aims to determine differences in 21st-century abilities, including critical thinking, creative thinking, communication skills, and collaboration skills, in 4 schools in the Yogyakarta region. This research is a comparative survey with a research sample of 60 students.

Design/methods/approach – The data collecting techniques used in interviews with questionnaires consist of 4 21st century abilities: critical thinking skills, creative thinking, communication skills, and collaboration skills.

Findings – The survey results showed differences in 21st-century abilities between schools AR with RA, AR with TY, RA with TY, RA with RB, and TY with RB. The *t*-test, where the sig prove this *t* value <0.05 is obtained in a row on the creative thinking ability of 0.001; 0.049; 0.00; 0.001; 0.024. Ability to think creatively in succession 0.003; 0.009; 0.000; 0.009; 0.005. 0.000 successive communication skills; 0.011; 0.000; 0.000; 0.003. Collaboration ability 0.002 consecutively; 0.001; 0.000; 0.003; 0.000. Then there is no difference between AR and RB schools. The value of sig evidences this. $t > 0.05$ in a row on critical thinking skills, creative thinking, communication skills, and collaboration skills 0.781; 0.702; 0.540; 0.624. The difference in ability is influenced by the learning method used.

Research implications/limitations – All study respondents were from four schools in Yogyakarta, Indonesia, which might limit the generalizability of the findings.

Practical implications – This research guides stakeholders of an early childhood education institution to take strategic policies in the 21st century.

Originality/value – This study contributes to the survey of differences in the abilities of early childhood in the 21st century in terms of different early childhood education institutions.

Keywords 21st century, Critical thinking, Creative thinking, Communication, Collaboration

Paper type Research paper

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Received: 27 December 2020; Revised: 25 May 2021; Accepted: 10 June 2021

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DOI: <http://dx.doi.org/10.14421/al-athfal.2021.71-04>

1. Introduction

In the 21st century, the world competes to develop technology from community service, economics, and society to education. These days, information and communication technology has become a thing that should exist and continue to be developed; moreover, technology development in the world causes a shift from traditional learning to digital learning (Wardani, Toenlio, & Wedi, 2018). During the COVID-19 pandemic, face-to-face, traditional-based learning should not be carried out. In order to continue during the COVID-19 pandemic, digital learning, also known as blended learning, was implemented, divided into two types of methods: synchronous and asynchronous. The previous research by Hasan and Malik shows that schools are ready for digital learning and implement blended learning, improving thinking and communication skills (Hasanah & Malik, 2020).

Nevertheless, when schools are not ready yet with digital learning, this will become the trigger for the unpreparedness for educators to carry out the learning process, which can impact the learning process and cannot achieve learning objectives optimally (Charbonneau-Gowdy, 2020). Digital-based learning is the implementation of technology applications in the field of education. Nowadays, the technology of digital-based learning is urgent because educators and students still have to do the learning process but cannot meet face to face yet (Dewayani, 2020). Moreover, technology can also be a medium for educators and students in doing the learning process (Ulfah, 2020).

The increasingly sophisticated technology affects human thinking; the higher the competition between humans, the higher the competition between humans. This disrupts because humans are competing to innovate to leave the old habits (Yigitcanlar, 2019). Moreover, some executives said that 4 out of 10 companies lost their positions in Japan due to the disruption effects (Wade, Loucks, Macaulay, & Cisco, 2017). Moreover, the competition is getting tougher day by day. Therefore stimulation is needed for future generations in order to be able to face the era of disruption. However, the field facts show that there are not many schools that stimulate students in objects of basic abilities for the 21st century (Pratiwi, Cari, & Aminah, 2019). Critical thinking stimulation has not been carried out optimally which the average critical thinking ability is less than 50% (Listiani, 2018). In addition, children's communication and collaboration skills are still low; this can be seen; this the level of communication in public speaking (Oktavianti & Rusdi, 2019). The result is that a generation is still lazy to think and lacks language skills (Lucas, 2019). Whereas the 21st century requires good thinking and analysis skills, good analysis indeed starts from a habit.

21st century skills are critical thinking skills, creative thinking skills, communication skills, and collaboration skills from an early age. Nowadays, people have entered the 21st century; through this research, the researchers would like to compare critical thinking skills, creative thinking skills, communication skills, and collaboration skills at four schools in Yogyakarta. This study aims to determine the differences between the four abilities in four different schools and what factors influence these differences.

2. Methods

This research is comparative survey research that compares 21st century students aged 5-6 years, such as critical thinking skills, creative thinking, communication skills, and collaboration skills (Creswell, 2014). The sample of this research is 60 students in 4 (four) schools; those are RA Ar-Rafif school with the initials AR as many as 15 children, RA Al-Mahalli with the initials RA as many as 15 children, TK YWKA Yogyakarta with the initials TY as many as 15 children, and RA Bunanyya with the initials RB, as many as 15 children in the Yogyakarta. The data collection technique used a questionnaire consisting of 4 aspects: critical thinking, creative thinking, communication skills, and collaboration skills. The following is the number of indicator points in each aspect to table 1.

Table 1. Number of Indicator Items

Questionnaire	Number of Indicators
Critical Thinking Ability	11
Creative Thinking Ability	12
Communicating Ability	13
Collaboration Ability	11

The developmental rating scale uses a numerical rating scale that educators fill out. The table below is a development assessment rating scale:

Table 2. Rating Scale

Child development	Scale
BSB (Very Well Developed)	4
BSH (Developing as Expected)	3
MB (Start to develop)	2
BB (Undeveloped)	1

The validity of the questionnaire has been tested, while the reliability test was tested through Cronbach alpha with SPSS. The following are the results of the reliability test with Cronbach alpha:

Table 3. Cronbach Alpha value

Questionnaire	Cronbach Alpha. value
Critical thinking	0.862
Creative Thinking	0.858
Communication skills	0.876
Collaboration Ability	0.913

The instrument used in this study is reliable; this is proven by the Cronbach alpha value > 0.6. Cronbach alpha value can be reliable if > 0.6 Sujarweni with the normality test assumptions (Sujarweni, 2014). The research data analysis technique used is the independent sample *t-test*. The following is a comparative design in this study:

Table 4. Comparison Design

Compared schools	Comparison
AR. school	RA. school TY school RB school
RA. school	TY school RB school
TY school	RB school

In order to avoid repetition, the comparison design is designed as table 4. AR schools were compared with RA, TY, and RB schools. RA schools were compared with TY and RB schools. Meanwhile, the TY school is compared to the RB school.

3. Result

The researcher uses the 5% level, meaning that if the value of *sig.t* > 0.05, then H_0 is accepted, it can be said that there is no significant difference. Then if the value of *sig.t* < 0.05, then H_0 is rejected, it can be said that there is a significant difference (Najmah, 2011). Based on the results of data analysis through the independent sample *t-test*, on aspects of critical thinking skills of children aged 5-6 years at four schools in the Yogyakarta area as follows table 5.

Table 5. Critical Thinking Aspect *t-test* Results

	RA	TY	RB
AR	0.001	0.049	0.781
RA		0	0.001
TY			0.024

The following are the results of the comparison of the *t-test* of critical thinking skills with SPSS:

		Levene's Test for Equality of Variances		t-test for Equality of Means			95% Confidence Interval of the Difference			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Critical Thinking Skill AR-RA	Equal variances assumed	4.592	.041	3.797	28	.001	6.06667	1.59782	2.79369	9.33964
	Equal variances not assumed			3.797	27.188	.001	6.06667	1.59782	2.78928	9.34406
Critical Thinking Skill AR-TY	Equal variances assumed	.117	.735	-2.055	28	.049	-3.00000	1.45972	-5.99011	-.00989
	Equal variances not assumed			-2.055	27.998	.049	-3.00000	1.45972	-5.99012	-.00988
Critical Thinking Skill AR-RB	Equal variances assumed	.191	.666	.281	28	.781	.40000	1.42339	-2.51568	3.31568
	Equal variances not assumed			.281	27.950	.781	.40000	1.42339	-2.51591	3.31591
Critical Thinking Skill RA-TY	Equal variances assumed	3.756	.063	-5.653	28	.000	-9.06667	1.60377	-12.35183	-5.78150
	Equal variances not assumed			-5.653	27.265	.000	-9.06667	1.60377	-12.35582	-5.77751
Critical Thinking Skill RA-RB	Equal variances assumed	4.901	.035	-3.608	28	.001	-5.66667	1.57076	-8.88423	-2.44910
	Equal variances not assumed			-3.608	26.778	.001	-5.66667	1.57076	-8.89086	-2.44248
Critical Thinking Skill TY-RB	Equal variances assumed	.005	.945	2.378	28	.024	3.40000	1.43006	.47065	6.32935
	Equal variances not assumed			2.378	27.927	.025	3.40000	1.43006	.47030	6.32970

The critical thinking aspect skills between AR schools and RA schools have a sig level. of $0.001 < 0.05$; thus, there is a difference in critical thinking skills between AR schools and RA schools. Furthermore, AR schools with TY schools have a sig level. of $0.049 < 0.05$; thus, there is a difference in critical thinking skills between AR and TY schools. Furthermore, AR schools with RB schools have a sig level. of $0.781 > 0.05$; thus, there is no difference in critical thinking skills between AR schools and RB schools. Furthermore, the RA school and the TY school have a sig level. of $0.000 < 0.05$; thus, there is a significant difference in critical thinking skills between RA and TY schools. Furthermore, RA schools with RB schools have a sig level of $0.001 < 0.05$; thus, there is a difference in critical thinking skills between RA schools and RB schools. Moreover, the TY school with the RB school has a sig level of $0.024 > 0.05$; thus, there is a difference in thinking ability.

The results of data analysis through the independent sample *t-test* of creative thinking skills of children aged 5-6 years four schools in the Yogyakarta area are as follows:

Table 6. *t-test* Result of Creative Thinking Aspect

	RA	TY	RB
AR	0.003	0.009	0.702
RA		0	0.009
TY			0.005

Here are the results of the comparison of the *t-test* of creative thinking skills with SPSS:

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Creative Thinking Skill AR-RA	Equal variances assumed	15.006	.001	3.208	28	.003	5.33333	1.66266	1.92752	8.73914
	Equal variances not assumed			3.208	24.409	.004	5.33333	1.66266	1.90481	8.76186
Creative Thinking Skill AR-TY	Equal variances assumed	.869	.359	-2.797	28	.009	-3.86667	1.38243	-6.69844	-1.03489
	Equal variances not assumed			-2.797	27.675	.009	-3.86667	1.38243	-6.69994	-1.03339
Creative Thinking Skill AR-RB	Equal variances assumed	1.594	.217	.387	28	.702	.53333	1.37760	-2.28855	3.35522
	Equal variances not assumed			.387	27.711	.702	.53333	1.37760	-2.28987	3.35654
Creative Thinking Skill RA-TY	Equal variances assumed	9.208	.005	-5.337	28	.000	-9.20000	1.72378	-12.73101	-5.66899
	Equal variances not assumed			-5.337	25.867	.000	-9.20000	1.72378	-12.74418	-5.65582
Creative Thinking Skill RA-RB	Equal variances assumed	9.699	.004	-2.791	28	.009	-4.80000	1.71991	-8.32308	-1.27692
	Equal variances not assumed			-2.791	25.787	.010	-4.80000	1.71991	-8.33675	-1.26325
Creative Thinking Skill TY-RB	Equal variances assumed	.082	.776	3.033	28	.005	4.40000	1.45078	1.42821	7.37179
	Equal variances not assumed			3.033	27.999	.005	4.40000	1.45078	1.42821	7.37179

AR and RA schools' creative thinking ability has a sig level of 0.0;<.05; thus, there is a difference in critical thinking skills between AR schools and RA schools. Furthermore, AR schools with TY schools have a sig level. of 0.009;0.05; thus, there is a difference in critical thinking skills between AR and TY schools. Furthermore, AR schools with RB schools have a sig level. 0.702 > 0.05. Thus, there is no difference in creative thinking skills between AR schools and RB schools. Furthermore, the RA and TY schools have a sig level of 0.000 < 0.05; thus, there is a significant difference in creative thinking skills between RA and TY schools. Furthermore, RA schools with RB schools have a sig level. 0.009 < 0.05; Thus, there is a difference in creative thinking skills between RA and RB schools. Then the TY school with the RB school has a sig level. of 0.005 < 0.05. Hence, there is a difference in creative thinking skills between TY schools and RB schools.

The results of data analysis through the independent sample *t-test* of communication skills of children aged 5-6 year four schools in the Yogyakarta area are as follows:

Table 7. Communication Ability *t-test* Results

	RA	TY	RB
AR	0	0.011	0.54
RA		0	0
TY			0.003

Communication skills between AR schools and RA schools have a sig level. of 0.000; < 0.05; thus, there is a difference in communication skills between AR schools and RA schools. Furthermore, AR schools with TY schools have a sig level of 0.011 < 0.05; thus, there is a difference in communication skills between AR and TY schools. Furthermore, AR schools with RB schools have a sig level of 0.540 > 0.05. Thus, there is no difference in communication skills between AR schools and RB schools. Furthermore, the RA school and the TY school have a sig level of 0.000 < 0.05; thus, there is a significant difference in communication skills between RA and TY schools. Meanwhile, RA schools with RB schools have a sig level of 0.000 < 0.05; thus, there is a significant difference in communication skills between RA schools and RB schools. Then the TY school with

the RB school has a sig level of $0.03 < 0.05$; thus, there is a difference in communication skills between TY schools and RB schools.

The following are the results of the comparison of the *t-test* of communication skills with SPSS:

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Communication Skill AR-RA	Equal variances assumed	8.337	.007	4.409	28	.000	7.40000	1.67843	3.96188	10.83812
	Equal variances not assumed			4.409	24.167	.000	7.40000	1.67843	3.93715	10.86285
Communication Skill AR-TY	Equal variances assumed	3.361	.077	-2.740	28	.011	-4.40000	1.60594	-7.68962	-1.11038
	Equal variances not assumed			-2.740	25.057	.011	-4.40000	1.60594	-7.70711	-1.09289
Communication Skill AR-RB	Equal variances assumed	.722	.403	.621	28	.540	.80000	1.28804	-1.83843	3.43843
	Equal variances not assumed			.621	27.987	.540	.80000	1.28804	-1.83849	3.43849
Communication Skill RA-TY	Equal variances assumed	.623	.437	-6.134	28	.000	-11.80000	1.92379	-15.74070	-7.85930
	Equal variances not assumed			-6.134	27.885	.000	-11.80000	1.92379	-15.74143	-7.85857
Communication Skill RA-RB	Equal variances assumed	7.096	.013	-3.958	28	.000	-6.60000	1.66762	-10.01596	-3.18404
	Equal variances not assumed			-3.958	23.862	.001	-6.60000	1.66762	-10.04285	-3.15715
Communication Skill TY-RB	Equal variances assumed	1.846	.185	3.261	28	.003	5.20000	1.59463	1.93354	8.46646
	Equal variances not assumed			3.261	24.759	.003	5.20000	1.59463	1.91417	8.48583

The results of data analysis through the independent sample *t-test* of the collaboration ability of children aged 5-6 years at four schools in Yogyakarta are as follows:

Table 8. *t-test* Result of Collaboration Ability Aspect

	RA	TY	RB
AR	0.002	0.001	0.624
RA		0	0.003
TY			0

The collaboration between AR schools and RA schools has a sig level. of $0.002 < 0.05$; thus, there is a difference in collaboration ability between AR schools and RA schools. Furthermore, AR schools with TY schools have a sig level. of $0.001 < 0.05$; thus, there is a difference in collaboration ability between AR and TY schools. Furthermore, AR schools with RB schools have a sig level of $0.624 > 0.05$; thus, there is no collaboration between AR and RB schools. Furthermore, the RA school and the TY school have a sig level. of $0.000 < 0.05$; thus, there is a significant difference in collaboration ability between RA and RB schools. Furthermore, RA schools with RB schools have a sig level. of $0.003 < 0.05$; thus, there is a difference in collaboration ability between RA schools. Then the TY school with the RB school has a sig level of $0.000 < 0.05$; thus, there is a significant difference in collaboration ability between TY schools and RB s.

The following are the results of the comparison of the collaboration ability *t-test* with SPSS:

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Collaborative Skill AR-RA	Equal variances assumed	9.392	.005	3.465	28	.002	5.46667	1.57762	2.23506	8.69828
	Equal variances not assumed			3.465	25.795	.002	5.46667	1.57762	2.22257	8.71077
Collaborative Skill AR-TY	Equal variances assumed	2.484	.126	-3.545	28	.001	-5.06667	1.42917	-7.99420	-2.13914
	Equal variances not assumed			-3.545	27.479	.001	-5.06667	1.42917	-7.99670	-2.13663
Collaborative Skill AR-RB	Equal variances assumed	.148	.703	.495	28	.624	.60000	1.21158	-1.88182	3.08182
	Equal variances not assumed			.495	26.925	.624	.60000	1.21158	-1.88629	3.08629
Collaborative Skill RA-TY	Equal variances assumed	2.888	.100	-6.329	28	.000	-10.53333	1.66438	-13.94266	-7.12401
	Equal variances not assumed			-6.329	27.291	.000	-10.53333	1.66438	-13.94665	-7.12001
Collaborative Skill RA-RB	Equal variances assumed	15.783	.000	-3.284	28	.003	-4.86667	1.48174	-7.90187	-1.83146
	Equal variances not assumed			-3.284	23.022	.003	-4.86667	1.48174	-7.93172	-1.80161
Collaborative Skill TY-RB	Equal variances assumed	2.622	.117	4.285	28	.000	5.66667	1.32258	2.95749	8.37584
	Equal variances not assumed			4.285	25.273	.000	5.66667	1.32258	2.94426	8.38907

4. Discussion

There are at least four basic abilities to stimulate 21st-century abilities so that children can face the era of disruption in the 21st century, including critical thinking skills, creative thinking, communication skills, and collaboration skills (Redhana, 2019). These four basic abilities are often referred to as 4Cs skills in the 21st century (Ariyana, Pudjiastuti, Bestary, & Zamroni, n.d.). *First*, critical thinking can interpret results and evaluate professional and active observation, communication, information, and argumentation (Fisher, 2001). Critical thinking can be interpreted as reasoning related to beliefs or behavior (Ennis, 1996). Critical thinking can be used as the basis or foundation for humans to develop themselves through learning, training, and various learning methods in critical thinking conditions and stages (J.L & Meredith, 2011). Critical thinking can be done by analyzing similarities and differences by observing and identifying causes and effects (Florea & Hurjui, 2015). Here are the stages of critical thinking (Arends, 2012).



Figure 1. Critical Thinking Stage

Second, creative thinking can think “differently” from others (Runco, 2007). Everyone can be creative, depending on how to develop it (Ormrod, 2009). Creative thinking encourages someone to create something; innovation is also included in creative thinking activities (Weisberg, 2006). Bringing up problems can stimulate one's creative abilities because, with a problem, someone will be faced with a solution (Williamson, 2011).

Third, communication skills are the ability to give and receive information (Barker, 2011). In the era of science, the world's progress has rapidly happened, which has created competition and innovation with high social implications (Rose, 2020). This is why communication skills are essential. In early childhood studies, children's communication skills are based on whether or not children dare to communicate the results (Karen Winter, Vivienne Cree, Sophie Hallett, Mark Hadfield, Gillian Ruch, n.d.).

Fourth, collaboration skills are indispensable in this 21st century. Collaboration is an activity to work together to achieve a common goal (Abdulsyani, 1994). If the collaboration is well organized, the new findings of the research will be revealed. Previous research on Mora shows that collaboration can increase students' motivation and increase active learning (Mora, 2020). It is proven by the previous research, who said that Educators could stimulate students through collaborative learning design (Suryani, 2010).

The explanation above shows the importance of stimulation 21st-century capabilities. The critical thinking ability data analysis results showed AR schools with RA schools, AR schools with TY schools, RA schools with TY schools, RA schools with RB schools, TY schools with RB schools, and critical thinking abilities. While the AR school and the RB school, there is no difference in critical thinking skills. According to Leicester and Taylor, the stages of critical thinking start from (1) *Focus*, meaning that students have to focus and identify the problems correctly when carrying out thinking activities. (2) *Reason*, after being appropriately identified, the next step is to determine the logical and reasonable reasons. (3) *Inference*, drawing conclusions based on logical reasons for a problem. (4) *Situation*, the conclusions that have been drawn in the previous stage are compared with the actual situation, whether it is related to reality or it still needs to be improved. (5) *Clarity*, after being by reality, should exist on the aspect of clarity at this process. The clarity can relate to an argument to minimize the occurrence of decision-making errors. (6) *Overview*, this stage is the last stage, where it is related to checking the decisions, conclusions, or findings. In addition, there is an aspect of critical thinking from a child's perspective in critical thinking. Below are the critical thinking aspects of a child's perspective (Leicester & Taylor, 2010).

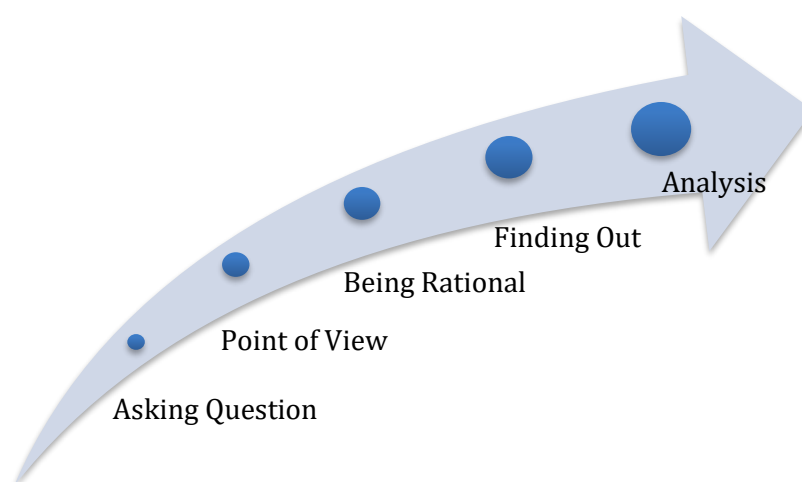


Figure 2. Critical Thinking Aspects

Aspects of critical thinking in children's perspective are divided into five aspects: (1) *Asking questions*, in this aspect, children are stimulated to dare to ask some questions about new things. By asking, children are actually in the stage of developing their knowledge. (2) *Point of view*:

Children are stimulated to improve a thought or opinion in this aspect. In order to form this second aspect, stimulation must be carried out continuously so that it will last a long time until adulthood. (3) *Being rational*, children are stimulated to give reasons accompanied by concrete evidence of their thinking in this aspect. In addition, children are also stimulated to accept the opinions of others. (4) *Finding out*; in this aspect, children are stimulated to find something new by doing simple science experiments and their parents. (5) *Analysis*, in this aspect, children are stimulated to carry out activities related to comparison and categorization. When children do activities related to comparison and categorization, they are doing analysis, for example, analyzing the order of an object starting from the biggest to the smallest, analyzing the order of objects starting from the smallest to the biggest, grouping similar objects, or grouping objects that have the same size.

Data analysis on creative thinking skills shows that AR schools, RA schools, AR schools with TY schools, RA schools with TY schools, RA schools with RB schools, TY schools, and RB schools have different creative thinking abilities. While the AR school and the RB school, there is no difference in creative thinking abilities. When children think creatively, they are going through the steps of the creative thinking process. Here are the thinking process steps (Guilford, 1973): (1) Preparation, which can be done by looking for information and techniques. (2) Concentration is an attempt to find the currently existing. (3) Problem selection, after concentration steps, is problem selection. At this stage, they analyze the problem that has been obsolete and will think about the current ideas. (4) Insight and illumination, after the problem selection, then develop knowledge and illumination. Illumination means enlightenment, which expects the current design ideas to become the current trends: (5) Verification, evaluation, and elaboration. After convincing the idea, verification is carried out by testing it then evaluating whether something needs to be improved from the idea. After an evaluation has been carried out and some corrections, the best results can be obtained; the last step is to work on the idea. In early childhood studies, children's creative power can be developed by building a safe and psychologically comfortable environment; children have space to explore their environment (Lilly, 2014).

Data analysis of communication skills showed AR schools with RA schools, AR schools with TY schools, RA schools with TY schools, RA schools with RB schools, TY schools with RB schools, and communication skills. Meanwhile, there are no differences in communication skills between the AR school and the RB school. The primary indicator leading this communication skill is that students communicate their opinions and thoughts (Aulia, Suwatno, & Santoso, 2018). Often children feel ashamed to express their opinions, so the children just keep quiet. There are at least three communication skills: (1) The ability to express their ideas. (2) The ability to interpret ideas verbally. (3) Ability to understand symbols and communicate them (NCTM, 2020). The stimulation in improving children to be communicative in doing something is done from an early age so that these abilities are inserted and internalized in children. When the teacher or parent does not stimulate this communication skill, children can have anxiety disorders such as *communication apprehension*. This anxiety disorder occurs due to the children's lack of experience and limited information, characterized by the fear and anxiety of speaking in public (Rogers, 2004).

The data analysis on collaboration ability shows AR schools and RA schools, AR schools and TY schools, RA schools and TY schools, RA schools and RB schools, TY schools, and R, B schools have collaboration abilities. Concurrently, there is no difference in collaboration ability between the AR school and the RB school. The advantages of collaborative learning, according to Hill and Hill, include: (1) Increasing achievement, (2) Deep understanding, (3) Increasing leadership, (4) Increasing good behavior, (5) Increasing self-esteem, (6) Inclusive learning, (7) Feeling of belonging to each other, (8) Increasing future (Setyosari & Punaji, 2009). Collaborative-based learning can improve students' sense of ownership over learning outcomes and present different levels of teamwork (Blau, 2020). In early childhood studies, collaborative learning can be applied through a scientific approach and experiments; for example, students do experiments in a group (Munastiwi, 2015). The red color is mixed with yellow; when the color changes, children are amazed and observe continuously until the conclusion is drawn.

Furthermore, based on the results of the analysis of 21st-century abilities, including critical thinking skills, creative thinking, communication skills, and collaboration skills, it shows the same results from a comparison of four schools, there are five comparisons of schools that show differences, which is the AR schools with RA, AR with TY, RA with TY, RA with RB, and TY with RB. Meanwhile, one of the schools' comparisons did not distinguish between AR schools and RB schools.

The differences in critical thinking skills, creative thinking, communication skills, and collaboration skills are affected by several learning factors. *First* using the curriculum, AR schools use the 2013 PAUD curriculum, RA schools use the 2013 PAUD curriculum, TY schools use the 2013 curriculum in, integrated with the school curriculum, RB schools use the 2013 PAUD curriculum. A curriculum of arrangements that contain objectives, content, and learning materials and methods used as guidelines for teaching and learning activities (Pendidikan, Kebudayaan, & Indonesia, 2003). The curriculum is reconstructive, changing according to circumstances and developing according to the child's learning outcomes (Wood, 2020). The four schools have used the 2013 PAUD curriculum as a learning reference. The 2013 PAUD curriculum is a curriculum that uses a scientific approach in its learning (Suminah, Nugraha, Lestari, Mareta, & Wahyuni, 2015). Research by Triyani et al. shows an effect of using a scientific approach on students' critical thinking skills (Triyani, Herayanti, & Gummah, 2019). In addition, based on research Sani, scientific approach-based learning can emerge higher-order thinking skills (Sani, 2015).

Second is learning methods, AR school discussion, and demonstration methods, RA schools use lecture and discussion methods, TY schools use lecture and discussion on specific themes using demonstrations, RB schools use discussion methods on specific themes integrated with the demonstration method. Educators use the learning method to establish relationships in the learning process to achieve learning objectives; learning methods are selected by the learning approach used by educators (Hoque, 2016). Research by Sulistyaningsih and Sunarno shows that discussion and demonstration methods can increase learning motivation and learning outcomes by using a scientific approach (Sulistyaningsih & Sunarno, 2017).

The third is the learning model; AR school uses discovery learning, RA school uses discovery learning, TY school uses discovery learning, RB school uses discovery learning. The learning model is one of the learning models in scientific learning (Musfiqon & Nurdyansyah, 2015). By using discovery learning models, students will be involved in finding findings by the learning objectives.

Fourth is learning strategies; AR school uses group individual learning, RA school uses group individual learning, TY school uses group individual learning, RB school uses group individual learning. Those four schools use group individual learning strategies. Research by Chang and Simpson shows that group individual learning strategies can be reduced to several learning characteristics in the learning process (Chang & Simpson, 1997).

Fifth is the learning approach; AR school uses the student center approach, RA school uses the student center approach, then the TY school uses the student center approach, the RB school uses the student center approach. Those four schools use the student center approach in learning activities. Moreover, using the student center approach in learning can improve the learning quality before school (Awwaliyah, 2019).

5. Conclusion

Based on the data analysis above, it can be concluded that statistically, there are differences in critical thinking skills, creative thinking, communication skills, and collaboration skills between AR and RA schools, AR and TY, RA and TY, RA, and RB, and TY with RB. This is proven by the *t-test* the value of *sig.t* < 0.05 on the ability to think creatively is 0.001; 0.049; 0.00; 0.001; 0.024 respectively. The ability to think creatively is 0.003; 0.009; 0.000; 0.009; 0.005 respectively. Communication ability 0.000; 0.011; 0.000; 0.000; 0.003 respectively. Collaboration ability respectively 0.002; 0.001; 0.000; 0.003; 0.000 *sig.t* value < 0.05 indicates that H_0 rejected, that means there is a difference in 21st century abilities in those schools. Then between AR and RB schools, there is no difference. The value of *sig* proves this. $T > 0.05$ respectively on critical thinking skills, creative thinking, communication skills, and collaboration skills 0.781; 0.702; 0.540; 0.624. The value of *sig.t* > 0.05 indicates that H_0 accepted means there is no difference in 21st-century abilities in AR and RB schools. The comparison results show differences based on the learning method used; therefore, this research is expected for stakeholders such as teachers and school principals to design skills stimulation-oriented learning in the 21st century.

Declarations

Author contribution statement

Erni Munastiwi conceived the presented idea, developed the theory, verified the analytical methods, discussed the results, and contributed to the final manuscript.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data availability statement

The data that support the findings of this study are available from the corresponding authors.

Declaration of interests statement

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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