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1 pesan

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From: Editor <editor@rigeo.org>
Date: Tu, 15 June 2021 Time 05.31 Pm
Subject: Editor Decision
To: Hardi <hardi.fit@iain-surakarta.ac.id>

Dear Hardi, H Suyitno, Kartono, N K Dwidayati
We are pleased to let you know that your paper entitled: "Online Learning: Mathematical Connection ability in terms of Learning Style and Gender." has been **Accepted** for publication in Rigeo Journal ISSN: 2146-0353.

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Best regards,
Editor in Chief

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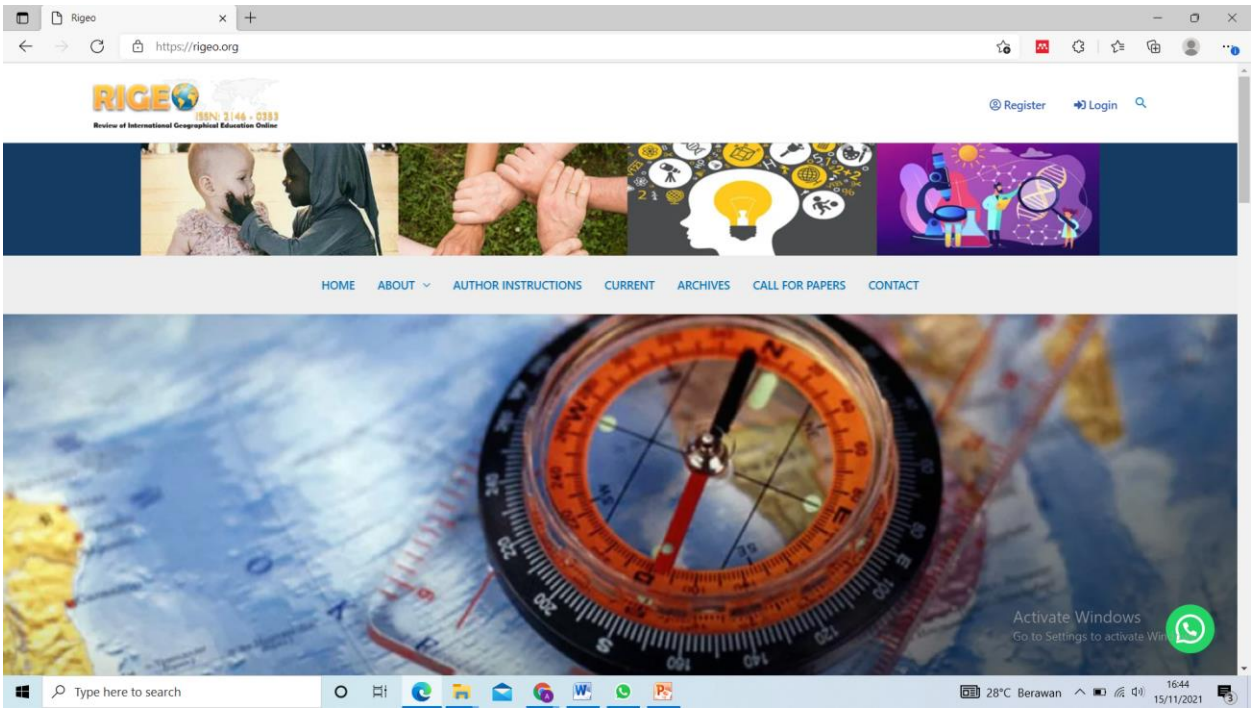

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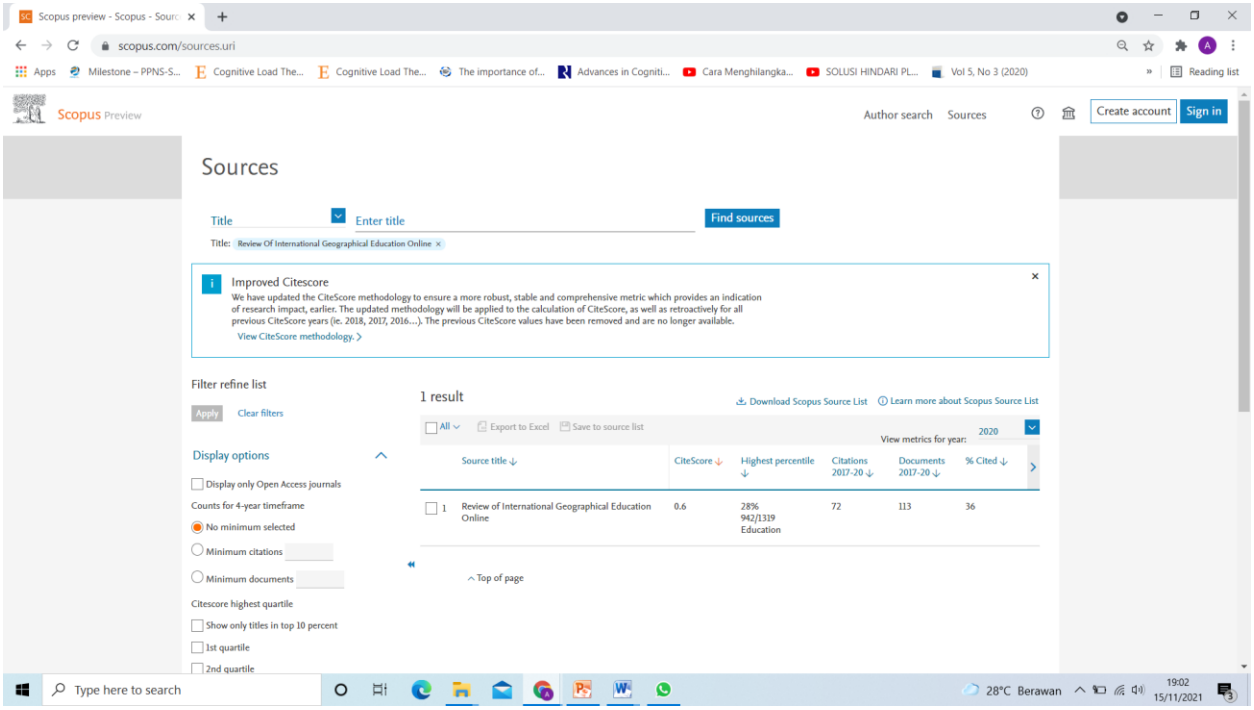

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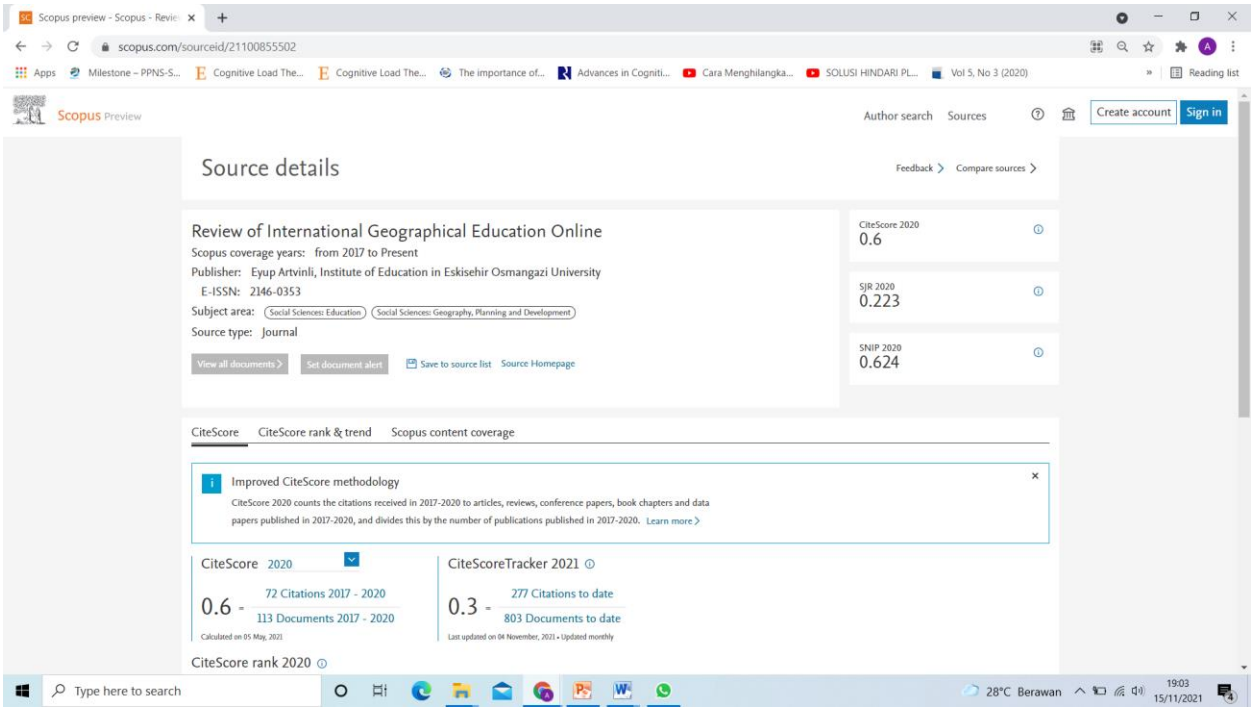

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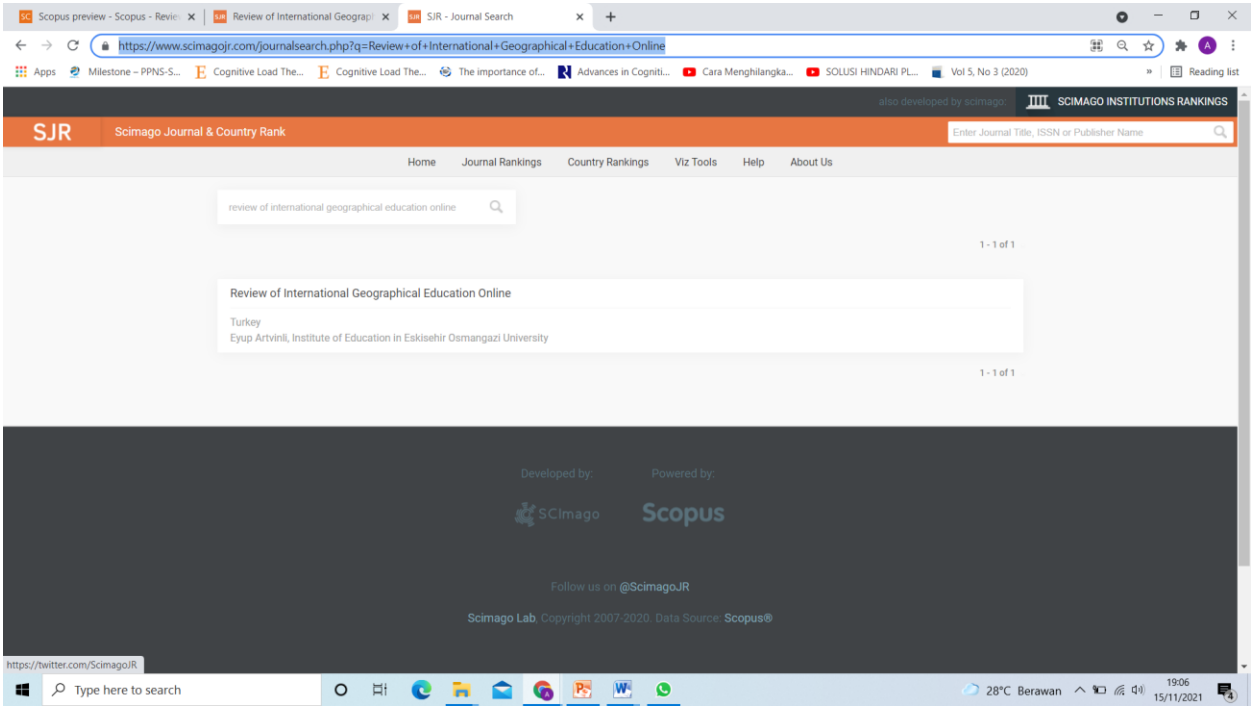

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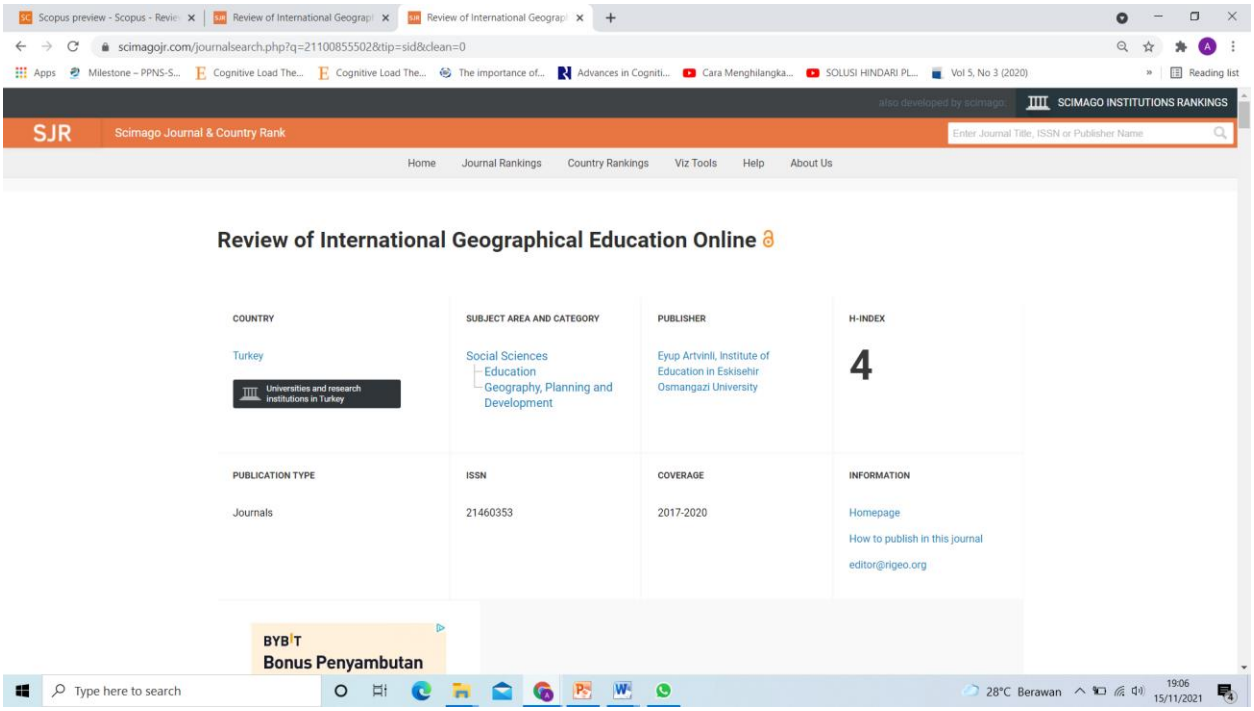

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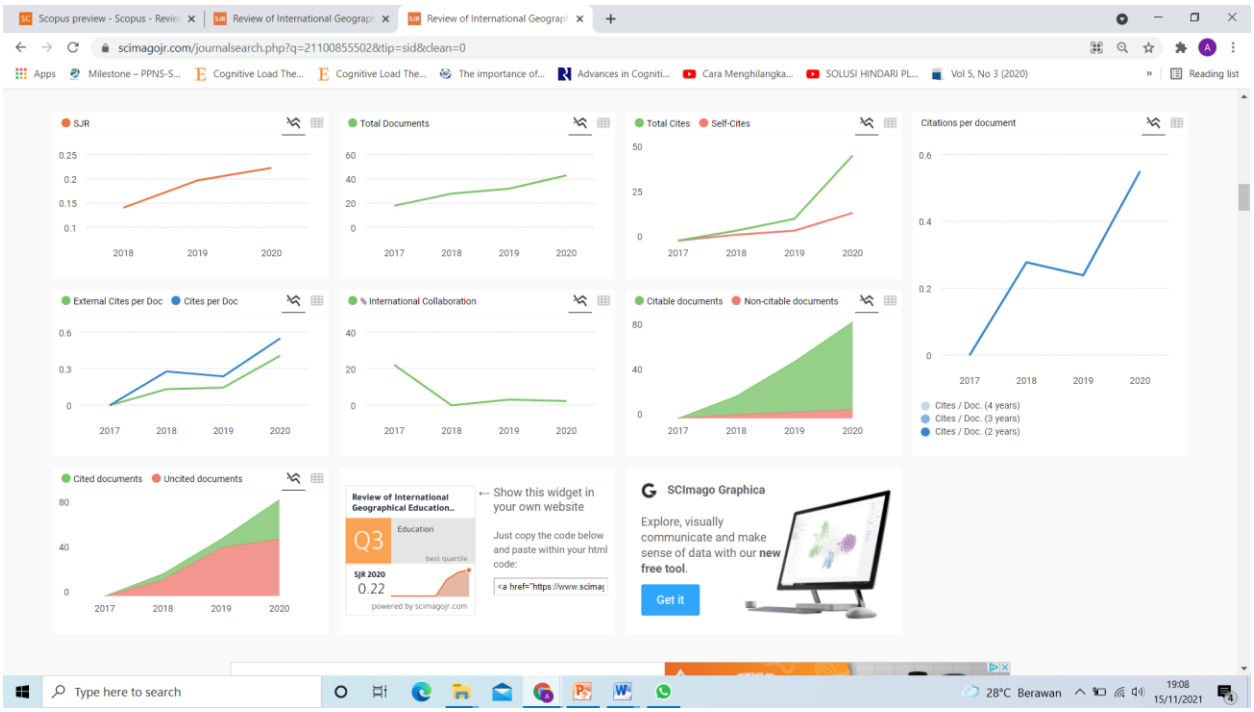

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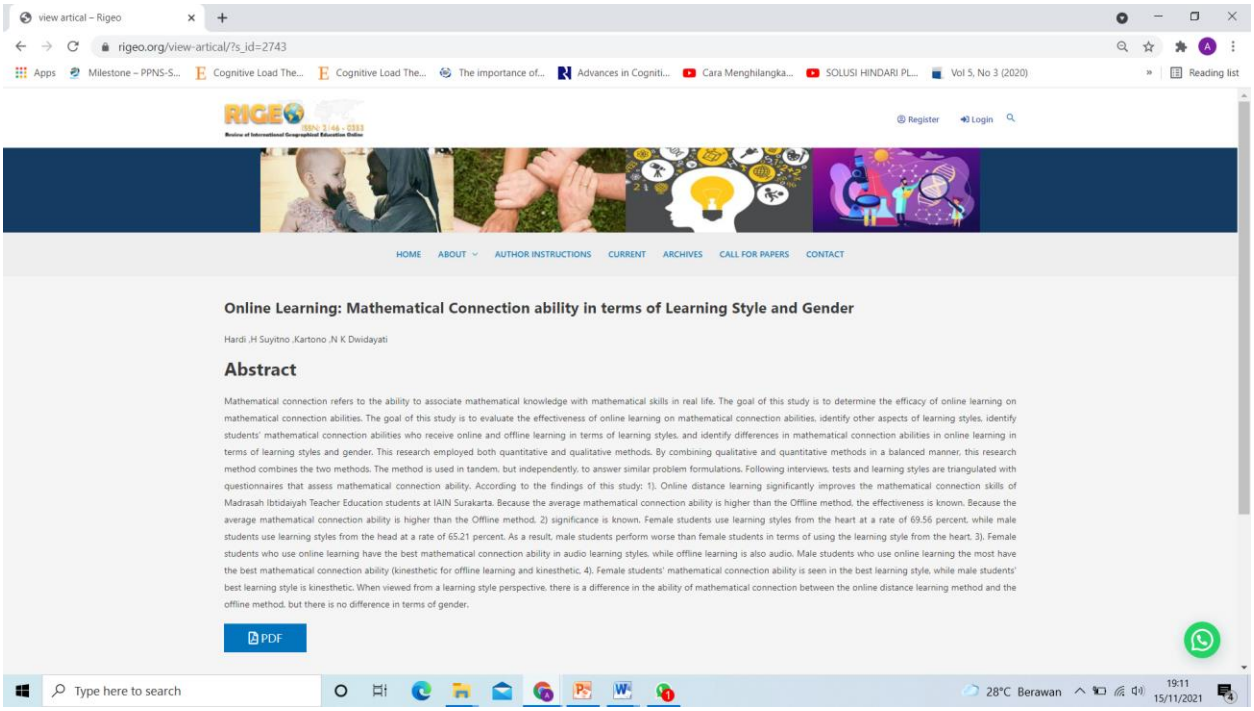

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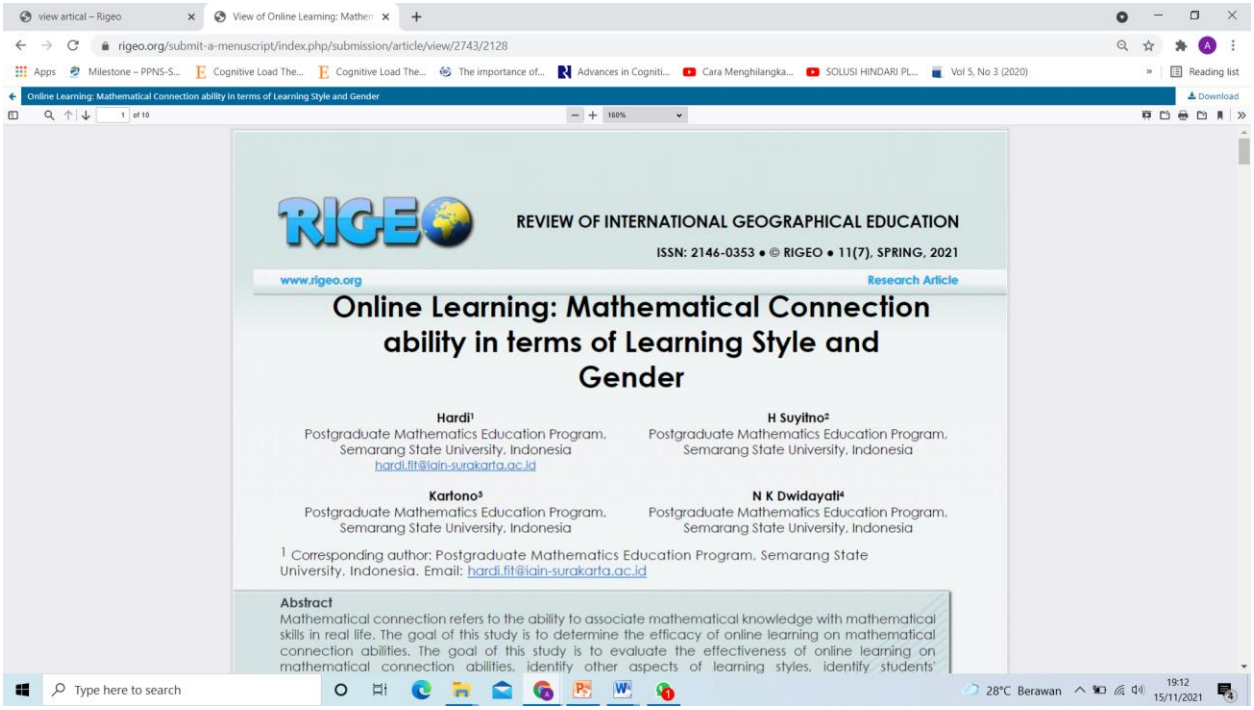

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Research Article

Online Learning: Mathematical Connection ability in terms of Learning Style and Gender

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Abstract

Mathematical connection refers to the ability to associate mathematical knowledge with mathematical skills in real life. The goal of this study is to determine the efficacy of online learning on mathematical connection abilities. The goal of this study is to evaluate the effectiveness of online learning on mathematical connection abilities, identify other aspects of learning styles, identify students' mathematical connection abilities who receive online and offline learning in terms of learning styles, and identify differences in mathematical connection abilities in online learning in terms of learning styles and gender. This research employed both quantitative and qualitative methods. By combining qualitative and quantitative methods in a balanced manner, this research method combines the two methods. The method is used in tandem, but independently, to answer similar problem formulations. Following interviews, tests and learning styles are triangulated with questionnaires that assess mathematical connection ability. According to the findings of this study: 1). Online distance learning significantly improves the mathematical connection skills of Madrasah Ibtidaiyah Teacher Education students at IAIN Surakarta. Because the average mathematical connection ability is higher than the Offline method, the effectiveness is known. Because the average mathematical connection ability is higher than the Offline method, 2) significance is known. Female students use learning styles from the heart at a rate of 69.56 percent, while male students use learning styles from the head at a rate of 65.21 percent. As a result, male students perform worse than female students in terms of using the learning style from the heart, 3). Female students who use online learning have the best mathematical connection ability in audio learning styles, while offline learning is also audio. Male students who use online learning the most have the best mathematical connection ability (kinesthetic for offline learning and kinesthetic, 4). Female students' mathematical connection ability is seen in the best learning style, while male students' best learning style is kinesthetic. When viewed from a learning style perspective, there is a difference in the ability of mathematical connection between the online distance learning method and the offline method, but there is no difference in terms of gender.

Keywords
Mathematical connection, online learning, learning style, gender

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Introduction

The purpose of learning mathematics is so that students have the ability in the field of mathematics. Mathematical abilities include understanding mathematical concepts, problem-solving, and communicating ideas with symbols, tables, diagrams, etc. However, it is unfortunate that many current learning processes have not been able to optimize these abilities, including mathematical connection abilities, which are in the low category (Masie, 2002; Permana & Sumarmo, 2007; Prastiwi, Soedjoko, & Mulyono, 2014; Sadikin & Hamidah, 2020). The common ability of mathematical connections has an impact on the low achievement of students in school. Every student can create a mathematical connection; it's just that their level of ability varies (Hoogland, Pepin, de Koning, Bakker, & Gravemeijer, 2018; Purwaningsih & Ardani, 2020). As a result, mathematical connection skills must be practiced in order for students to solve problems in the future by connecting mathematics with other sciences. As a result, what is did learn in school or on campus will be useful in everyday life. The ability of mathematical connections refers to a person's ability to relate topics in mathematics to other sciences and life(Defitriani, 2018; Hoogland et al., 2018; Purwaningsih & Ardani, 2020; Puteri & Riwayati, 2017; Putri, 2020; Syarif, 2012).

Mathematical connections are a component of a knowledge network that includes critical concepts, understanding, and the importance of relationships between mathematical ideas, concepts, and procedures. The ability to associate mathematical knowledge with mathematical skills in real life is referred to as mathematical connection. This provides opportunities for students to continue improving there own mathematical skills. Someone who understands the relationship between mathematical concepts not only memorizes or remembers concepts in the short term, but his mastery of concepts is more durable (long term memory), and he can apply concepts to other situations(Nugraha & Pujiastuti, 2019; Nurafni & Pujiastuti, 2019).

There are many other indicators of the mathematical connection: 1) Recognize and apply the connection between mathematical ideas. In this case, connections can assist students in applying what they have learned. Students can recall previous concepts studied with the new context that will be studied. 2) Actually recognise the relationship of mathematical ideas and integrate them to form a comprehensive relationship. At this stage, students can see the same mathematical structure in different contexts, resulting in a better understanding of the relationship between one concept and another. 3) Recognize and apply mathematics in real situations. At this point, the external contexts of mathematics are concerned with the relationship of mathematics to daily life. Then, the outcomes of mathematics learning become more meaningful (Lesh, Yoon, & Zawojewski, 2020; Linto, 2012), students are motivated to improve their knowledge, and the teacher serves as a facilitator (Burkhardt, 2006; Kaiser, Blomhøj, & Sriraman, 2006; Kastner, 2020; Lesh et al., 2020; Schnotz, Baadte, & Müller, 2010; Schoenfeld, 2016).

Many factors influence the relevancy of student learning outcomes, one of which is the use of strategies, approaches, or models in their learning. To achieve good results in teaching, educators must find appropriate methods, procedures, or learning models(Wardani, Toenlioe, & Wedi, 2018; Yu, 2009).Face-to-face learning is the most common type of learning. Still, this is sometimes considered too old-fashioned and is often referred to as conventional learning, so it requires proper learning in addition to traditional learning(Rambe & Yarni, 2019; Schnotz et al., 2010; Schoenfeld, 2016; Siagian, 2016; Syarif, 2012), namely through online distance learning or e-learning. This learning process will not be out of date and will produce results that are more effective and in line with expectations (Abdullah, 2018). However, a learning process that is solely based on technology will not be fully successful. This is due to the fact that each student's learning style is different.

The suitability of our behaviour and attitude in understanding a piece of information is referred to as our learning style. The information is then transformed into a concept that we can recall within a certain time frame. As a result, we can say that learning style is the most natural way for individuals to absorb, organize, and process information. A good learning style is important for student success in school. Realizing this allows students to absorb and process information more effectively, making learning easier for them based on their learning styles (Burkhardt, 2006; Darkasyi, Johar, & Ahmad, 2014; Garratt-Reed, Roberts, & Heritage, 2016). Students can play a role in obtaining information if they have the right learning style. The information received can enter students' experiences and be stored for a long time.

Gender differences (gender) can result in learning psychology differences(Nugraha & Pujiastuti, 2019; Nurafni & Pujiastuti, 2019) (Nugraha & Pujiastuti, 2019). Gender differences not only affect

mathematics, but also knowledge of mathematics (Aliyah et al., 2019). Learners with visual and auditory learning styles may advantage from participating in e-learning. Students with kinesthetic learning styles, on the other hand, may have a low chance of success in the learning process(Wardani et al., 2018; Widyawati, 2016; Yu, 2009) Students in high school, on the other hand, achieve more when they have visual and auditory learning styles rather than kinesthetic learning styles.

Online distance learning is one of the most effective learning methods for facilitating learning styles and improving mathematical connection skills. This learning makes use of the internet network, which provides accessibility, connectivity, flexibility, and the ability to present a variety of learning interactions (Keitel, 2001; Eko Kuntarto, 2017; E. Kuntarto, 2020; Sadikin & Hamidah, 2020; Zhang, Zhao, Zhou, & Jay, 2004). The goal is to provide quality learning services in a large and open network in order to attract more and wider interest in learning spaces (Siagian, 2016; Sulistyaningsih, Waluya, & Kartono, 2012; Syarif, 2012), because the use of the internet and multimedia technology can change the way knowledge is delivered and can be an alternative to traditional classroom learning (Masie, 2002; Niss, Blum, & Galbraith, 2007; Zhang et al., 2004).

Online learning will be extremely useful for tertiary students. Students will make the best use of reading resources and technology that are relevant to online teaching materials. When there are sources that make students feel confused or cause students to have misconceptions, students can seek advice and confirmation from educators offline. As a result, online distance learning enables students to identify and carefully review material.

In other words, online distance learning can benefit from the development of perspectives, assisting students in strengthening their thinking and, as a result, improving mathematical connections with other disciplines, resulting in a more meaningful understanding (Keitel, 2001; Putri, 2020; Qodariyah & Hendriana, 2015).The associated impact that can be obtained. Students are perceived to have increased motivation to learn (Abdullah, 2018; Altay & Altay, 2019; Burkhardt, 2006)). Based on this, educators are expected to plan the learning process based on each student's learning style (Tomlinson, 2001; Tratnik, Urh, & Jereb, 2019).

Methodology

Research methods

The author's research method is a mixed-method research method. This research method is based on several points of view, namely According to Creswell (2007), mixed methods research focuses on collecting, analyse, and combining quantitative and qualitative data in a single study or series of studies. Its central premise is that trying to combine quantitative and qualitative approaches yields a better understanding of research problems than either approach alone.

A combination model method, also known as a concurrent triangulation design, is a study that combines qualitative and quantitative research methods by combining the two methods(Tomlinson, 2001; Tratnik et al., 2019) This method is used in tandem, but independently, to answer similar problem formulations.

Population and Sample

This study's population here include: (1) Madrasah Ibtidaiyah Teacher Education students; (2) Tarbiyah and Teacher Training IAIN Surakarta faculty; and (3) a total of 108 students from three classes. While 72 students from two classes and one from the population were used to test the instrument, the number of samples taken from the population was 72.

Data collection instruments and techniques

Instruments according to the problem formulation and data collection techniques are described in table 1.

Table 1.
Problem Solving, Data Collection Methods, and Data Sources

Number	Formulation of the problem	Data collection technique	Data source
1.	The impact of online learning on female students' mathematical connection ability	Documentation, Questionnaire, and Test	Student
2	The impact of online learning on male students' mathematical connection ability	Documentation, Questionnaire, and Test	Student
3	Are there any other aspects of learning styles, such as audio, visual, and kinesthetic, that have an impact on male students' mathematical connection abilities?	Documentation, Questionnaire, and Test	Student
4	Are there any other aspects of learning styles, such as audio, visual, and kinesthetic, that have an impact on female students' mathematical connection abilities?	Documentation, Questionnaire, and Test	Student
5	In terms of learning styles, analyzing the mathematical connection ability of female students who receive online and offline learning	Documentation, Questionnaire, and Test	Student
6	In terms of learning styles, analyzing the mathematical connection ability of male students who receive online and offline learning	Documentation, Questionnaire, and Test	Student
7	In terms of learning styles and gender, are there differences in the mathematical connection abilities of students who receive online and offline learning?	Documentation, Questionnaire, and Test	Student

Results And Discussion

Tables 2 and 3 show the mathematical connection ability of Madrasah Ibtidaiyah IAIN Surakarta Teacher Education study program students from the two classes.

Table 2
Mathematics Connection Ability of Second Grade Students

Class	N	Minimum	Maximum	Mean	Std. Deviation
Online Learning	35	40	100	84.00	15.1
Offline learning,	36	40	100	74.00	17.2

Table 3
Mathematical Connection Ability of Students as Determined by Connection Type

Class	Category	Connection Type		
		Relationships between topics	Relationships with other sciences	Relationship with everyday life
Online Learning	Minimum Value	5	10	10
	Maximum Value	30	35	35
	Average	26.80	31.71	29.28
	%	89,33	90.61	83.65
Offline learning	Minimum Value	10	10	10
	Maximum Value	30	35	35
	Average	21.38	23.61	27.91
	%	71.26	67.26	79.76

Tables 4 and 5 show the mathematical connection ability of students in the Madrasah Ibtidaiyah Teacher Education study program at IAIN Surakarta.

Table 4
Students' Mathematical Connection Ability According to Learning Style

Class	Category	Learning Style			
		Audio	**Visual**	**Kinestetik**	**Other**
Online Learning	Minimum Value	40	45	50	65
	Maximum Value	100	100	85	100
	Average	86.42	81.00	78.87	86.11
Offline learning,	Minimum Value	40	50	40	45
	Maximum Value	95	100	95	100
	Average	76.00	75.62	73.33	65.90

Table 5
Students' Mathematical Connection Ability According to Learning Style

Class	Category	Learning Style			
		Audio	**Visual**	**Kinestetik**	**Other**
Online Learning	High	2	1	0	5
	Medium	11	3	6	4
	Low	1	1	1	0
Offline learning	High	1	2	3	2
	Medium	3	5	5	5
	Low	2	1	3	4

The ability of students of the Madrasah Ibtidaiyah Teacher Education study program IAIN Surakarta to connect mathematically is seen in the three classes used as research data, as shown in tables 6 and 7.

Table 6
Mathematics Ability of Third Grade Students

Class	N	Min	Max	Mean	Std.Deviation	Variance
Instrument Trial (A)	34	65	95	80.5882	6.71551	45.024
Online Learning (B)	35	65	95	82.4286	6.34445	40.195
Offline learning(C)	36	70	95	80.5556	8.43274	71.064

Table 7
Test of Differences in Mathematics Ability of Third Grade Students

Class	T_{count}	t_{table}	Test Decision
Instrument Trial (A) vs Online Learning (B)	1.1690	2.0000	Ho accepted
Instrument Trial (A) vs Offline learning (C)	0.0180	2.0000	Ho accepted
Online Learning (B) vs Offline learning (C)	1,0590	2.0000	Ho accepted

Table 6 clearly shows the differences in students' mathematical abilities from the three classes, with the average value of class A = 80,5882, class B = 82,4286, and class C = 80,5556 all falling within the same range. Meanwhile, it is clear from Table 7 that all Ho is accepted. This means that the three classes used for the Difference Test all start out with the same ability. In addition, the normality test is performed, as shown in table 8.

Table 8
Mathematical Connection Ability Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Offline learning	.115	35	.200*	.945	35	.077

a. Lilliefors Significance Correction

The statistical value obtained at the output is 0.115, and the P-Value obtained is 0.077. H0 is accepted because of the P-value (there is insufficient evidence/data to reject H0). As a result, at the 95 percent confidence level, the test class data for basic mathematical concepts are normally distributed. The homogeneity test in table 9 is the next step.

Table 9
Students' Mathematical Connection Ability Homogeneity Test

		Levene Statistic	df1	df2	Sig.
Student Mathematics connection ability	Using the Mean	3.095	1	69	.083
	Based on the Median	2.670	1	69	.107
	Based on the median and with a df that has been adjusted	2.670	1	68.862	.107
	Using the trimmed mean	3.179	1	69	.079

In the output above, the P-Value value is 0.079. This value is greater than the selected value of, namely, = 0.05. Because the P-Value value is 0.05, then H0 is accepted (not enough

evidence/data to reject H0). Thus, it can be concluded that at the 95% confidence level, the variance of the students' pretest data in the basic concepts of mathematics courses is homogeneous.
After the data is normal and homogeneous, the next step is to determine the distribution of each indicator's mathematical connection capabilities, which can be seen in table 10.

Tabel 10

Distribution of Students' Mathematical Connection Ability in Terms of Connection Type

Class	Category	Connection Type					
		Relationships between topics		Relationships with other sciences		Relationship with everyday life	
		Male	Female	Male	Female	Male	Female
Online Learning	High	8	21	4	14	2	8
	Medium	0	4	4	12	5	17
	Low	0	2	0	1	1	2
Offline learning	High	4	9	3	5	6	9
	Medium	1	6	7	13	4	9
	Low	7	9	2	6	2	6

The research findings on students' mathematical connection abilities, the type of connection between topics (Mat.1) using online distance learning, after being categorized, it was found that: high category 21 students = 77.77%, medium 4 students = 14.81%, low 2 students = 7.40%. Meanwhile, those who used Offline learning were 9 students = 37.50%, Medium 6 students = 25% and low 9 students = 37%. The research findings on students' mathematical connection skills with connection types with other disciplines (Mat.2) using online distance learning found that: High category 14 students = 51.85%, medium 12 students = 44.44%, Low 1 student = 3.70%. While those who use Offline learning High 5 students = 20.83%, Medium 13 students = 54.16% and low 6 students = 25%. The study's findings on students' mathematical connection abilities, the type of connection applied in daily life (Mat.3) using online distance learning, found that: high category 8 students = 29.62%, medium 17 students = 62.96%, Low 2 students = 7.40%. While those who use Offline learning are 9 students, high = 37.50%, Medium 9 students = 37.50% and low 6 students = 25%.
Based on data analysis, it is known that online learning is more effective than offline learning in improving understanding of female students' mathematical connections based on their learning style; this is because online learning is learning that is carried out using technology as a learning resource tool, with the conditions of educators and participants students not having to meet face to face, which has a significant impact on learning outcomes. The use of the internet and multimedia technology has the potential to change the way knowledge is delivered. It can be used as an alternative to traditional/face-to-face (offline) classes to optimize learning . when compared to learning offline.
Female students' mathematical connection ability in online learning with audio, visual, and kinesthetic learning styles is not the same. The audio learning style is the most effective online learning style for female students looking to improve their mathematical connection skills. Visual and kinesthetic learning styles, on the other hand, are still useful for improving mathematical connection skills. Meanwhile, in terms of type of connection, the first type of connection, namely connecting between topics, is the most optimal type of connection for female students to improve mathematical connection skills. The third type of connection, namely connecting/connecting in everyday life, has the lowest ability.
Thus according (Tratnik et al., 2019) gender influences the acquisition of mathematical knowledge, with female students generally outperforming male students in language and writing. Female students outperform male students in terms of thought accuracy, thoroughness, and

thoroughness. Meanwhile, (Widyawati, 2016) claim that students with visual and auditory learning styles will thrive in online learning. Students with kinesthetic learning styles, on the other hand, may have a low chance of success in the learning process. However, students in high school and students achieve more when they have visual and audio learning styles rather than kinesthetic learning styles (Widyawati, 2016).

Online learning, like female students, is more effective than offline learning in improving male students' mathematical connection skills. When learning involves the appropriate student learning styles, online learning for male students can improve mathematical connection skills optimally. Male students, on average, outperform female students when it comes to reasoning. Male students outperform female students in mathematical concepts and dynamics (Tratnik et al., 2019).

The previous description can explain why online learning is more effective than offline learning in getting better male students' mathematical connections based on their learning styles. This is because online learning is learning carried out using technology as a learning resource tool, with the condition that the educator and students do not have to meet face-to-face, which has a significant impact on learning outcomes. With the use of the internet and multimedia technology, it is possible to change the way knowledge is delivered and to provide an alternative to traditional/face-to-face (offline) classes (Zhang et al., 2004).in order to optimize learning(Linto, 2012; Muchlis et al., 2018) compared to offline learning.

For male students with online learning and audio, to use visual and kinesthetic learning styles see how mathematical connection abilities are. That with online learning, male students with optimal kinesthetic learning styles are used to improve mathematical connections. However, for audio learning styles, it can also be said that it is relevant to enhance mathematical connections in terms of connecting/connecting in everyday life and the lowest in the first mathematical connection, namely connecting between topics.

According to(Tratnik et al., 2019) Trisnawati (2013), male students prefer an assimilator learning style that allows them to learn through abstract conceptualization, reflection observation, and learning by seeing and thinking or visually. Meanwhile, (Wardani et al., 2018)) assert that students with visual and auditory learning styles will benefit from online learning. Students with kinesthetic learning styles, on the other hand, may have a low chance of success in the learning process. However, students in high school and students achieve more when they have visual and audio learning styles rather than kinesthetic learning styles (Widyawati, 2016).

Conclusion

The data analysis results show that: 1). Online distance learning effectively improves the mathematical connection skills of Madrasah Ibtidaiyah Teacher Education study program students at IAIN Surakarta. Because the average mathematical connection ability is higher than the Offline method, the effectiveness is known. Because the average mathematical connection ability is higher than the Offline method, the effectiveness is known; 2) Female students use the aspect of learning style from the heart at a rate of 69.56 percent, while male students use it at a rate of 65.21 percent. As a result, male students perform worse than female students in terms of using the learning style from the heart; 3). Female students who use online learning have the best mathematical connection ability in audio learning styles, while offline learning is also audio. Male students who use online learning the most have the best mathematical connection ability for offline learning and kinesthetic; 4). Female students' mathematical connection ability is seen in the best learning style, while male students' best learning style is kinesthetic. When viewed from the perspective of a learning style, there is a difference in the mathematical connection between online distance learning and offline methods. At the same time, there is no distinction based on gender.Based on the conclusions presented, there is a need for a more in-depth study of other learning styles, for example, the learning style with the heart that needs to be optimized to improve the ability of mathematical connections.

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