Prisma Sains : Jurnal Pengkajian Ilmu dan Pembelajaran MIPA IKIP Mataram
ISSN 2338-4530 (Print) ISSN 2540-7899 (Online) | website: ojs.ikipmataram.ac.id/index.php/prismasains/index
Accredited Sinta 3 by Ministry of Research, Technology and Higher Education (Ristekdikti) of the Republic of Indonesia, Decree No. 10/E/KTP/2019
prismasains.pkpsm@gmail.com @prisma.sains.9 Pemuda 59A Mataram +6287864524853

#2615 Summary

Submission

Authors	Intan Dwi Hastuti, Yuni Mariyati, S. Sutarto, Chairun Nasirin
Title	The Effect of Guided Inquiry Learning Model to the Metacognitive Ability of Primary School Students
Original file	2615-6311-1-SM.DOCX 2020-05-15
Supp. files	None
Submitter	- intan dwi hastuti
Date submitted	May 15, 2020 - 02:22 PM
Section	Research Articles
Editor	Hunaepi Hunaepi
Abstract Views	600

Status

Status	Published Vol 8, No 1: June 2020
Initiated	2020-07-13
Last modified	2020-08-03

Submission Metadata

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Title and Abstract

Title	The Effect of Guided Inquiry Learning Model to the Metacognitive Ability of Primary School Students
Abstract	This study aimed at analyzing the effect of guided inquiry learning to the metacognitive ability of primary school students on the material of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*). The type of study was a mixed-method using quantitative and qualitative methods. There were 55 students of 4th grade used as the subjects of study. Two learning models were compared, namely guided inquiry learning model and conventional learning model. The students' metacognitive ability was measured by means of problem-solving test on the material of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*). The quantitative analysis data used descriptive and inferential statistical tests. According to the results of data analysis, it was discovered that the t-test of sig (2-tailed) from the independent samples t-test of post-test was 0,00 (p = <0,05); this indicated that there was a significant difference on it. This showed that there was a difference of students' metacognitive ability for both classes in solving the problems of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*) after the guided inquiry learning was implemented. Consequently, it can be concluded that there is a significant effect on the implementation of guided inquiry learning model to improve the students' metacognitive ability in solving the material problems of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*).

Indexing

Keywords	Guided Inquiry, Metacognitive Ability, Primary School
Language	en

Supporting Agencies

Agencies	LPPM Universitas Muhammadiyah Mataram

OpenAIRE Specific Metadata

ProjectID —

References

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#2615 Review

SUMMARY **REVIEW** EDITING

Submission

Authors	Intan Dwi Hastuti, Yuni Mariyati, S. Sutarto, Chairun Nasirin
Title	The Effect of Guided Inquiry Learning Model to the Metacognitive Ability of Primary School Students
Section	Research Articles
Editor	Hunaepi Hunaepi

Peer Review

Round 1

Review Version	2615-6312-1-RV.DOCX 2020-05-15
Initiated	2020-07-05
Last modified	2020-07-05
Uploaded file	Reviewer A 2615-6926-1-RV.DOCX 2020-07-05

Editor Decision

Decision	Accept Submission 2020-07-13
Notify Editor	Editor/Author Email Record 2020-07-07
Editor Version	2615-7002-1-ED.PDF 2020-07-13
Author Version	2615-6967-1-ED.DOCX 2020-07-06 DELETE
Upload Author Version	Telusuri... Tidak ada berkas dipilih. Upload

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ISSN 2338-4530 (Print) ISSN 2540-7899 (Online) | website: ojs.ikipmataram.ac.id/index.php/prismasains/index
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#2615 Editing

SUMMARY REVIEW **EDITING**

Submission

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Title	The Effect of Guided Inquiry Learning Model to the Metacognitive Ability of Primary School Students
Section	Research Articles
Editor	Hunaepi Hunaepi

Copyediting

COPYEDIT INSTRUCTIONS

REVIEW METADATA

		REQUEST	UNDERWAY	COMPLETE
1.	Initial Copyedit File: None	—	—	—
2.	Author Copyedit File: None Telusuri... Tidak ada berkas dipilih. Upload	—	—	
3.	Final Copyedit File: None	—	—	—

Copyedit Comments No Comments

Layout

Galley Format		FILE		
1.	PDF VIEW PROOF	2615-7038-1-PB.PDF 2020-07-19		19

Supplementary Files — FILE

None

Layout Comments No Comments

Proofreading

REVIEW METADATA

		REQUEST	UNDERWAY	COMPLETE
1.	Author	—	—	
2.	Proofreader	—	—	—
3.	Layout Editor	—	—	—

Proofreading Corrections No Comments PROOFING INSTRUCTIONS

Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram
http://ojs.ikipmataram.ac.id/index.php/prismasains/index
e-mail: prismasains.pkpsm@gmail.com

Month Year. Vol. x, No. y
p-ISSN: 2338-4530
e-ISSN: 2540-7899
pp. xx-yy

Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Metakognitif Sekolah Dasar.

Abstract

Penelitian ini bertujuan untuk menganalisis pengaruh pembelajaran inkuiri terbimbing terhadap kemampuan metakognitif siswa sekolah dasar pada materi Kelipatan Persekutuan Terkecil (KPK) dan Faktor Persekutuan Terbesar (FPB). Jenis penelitian ini adalah penelitian kuantitaif. Subjek penelitian ini terdiri dari 55 siswa kelas empat. Dua model pembelajaran dibandingkan yaitu model pembelajaran inkuiri terbimbing dan model pembelajaran konvensional. Keterampilan metakognitif siswa diukur dengan tes pemecahan masalah materi materi Kelipatan Persekutuan Terkecil (KPK) dan Faktor Persekutuan Terbesar (FPB). Analisis data kuantitatif menggunakan uji statistik deskriptif dan inferensial. Hasil uji-t sig (2-tailed) dari uji-t sampel independen post-test adalah 0,00 (p = <0,05), sehingga signifikan. Ini menunjukkan bahwa kedua kelas ada perbedaan pada kemampuan metakognitif siswa dalam menyelesaikan masalah materi Kelipatan Persekutuan Terkecil (KPK) dan Faktor Persekutuan Terbesar (FPB) setelah penerapan inkuiri terbimbing. Dengan demikian dapat disimpulkan bahwa ada pengaruh yang signifikan dari penerapan model pembelajaran inkuiri terbimbing dalam meningkatkan kemampuan metakognitif siswa dalam menyelesaikan masalah materi Kelipatan Persekutuan Terkecil (KPK) dan Faktor Persekutuan Terbesar (FPB).

Keywords: *Inkuiri terbimbing; Kemampuan metakognitif; Sekolah dasar.*

How to Cite: Hastuti, I., Mariyati, Y., & Sutarto. (2020). Pengaruh Model Pmebelajaran Inkuiri Terbimbing Terhadap Kemampuan Metakognitif Sekolah Dasar. *Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram, vol*(no), xx-yy. doi:https://doi.org/10.33394/j-ps.vxxiyy

https://doi.org/10.33394/j-ps.vxxiyy

PENDAHULUAN

Kemampuan metakognitif menjadi indikator yang ditekankan dalam tercapainya tujuan pembelajaran. Keterlibatan kemampuan metakognitif menjadi komponen penting dalam kegiatan pembelajaran karena dapat mendorong kemampuan berpikir tingkat tinggi (Kuzle, 2013; Biryukov, 2014; Wismath, Orr, & Good, 2014). Metakognisi didefinisikan sebagai bagian dari kemampuan berpikir tingkat tinggi yang meliputi pemahaman, analisis, dan kontrol proses kognitif (Dorr & Perels, 2019; Flavell, Miller, & Miller 2002). Metakognisi juga dapat didefinisikan sebagai kemampuan untuk memikirkan apa yang telah dipikirkan yang mencakup tiga aktivitas yaitu kesadaran, regulasi, dan evaluasi (Hastuti, Nusantara, Subanji, & Susanto, 2016). Keterlibatan metakognisi dapat membantu siswa dalam menyelesaikan masalah karena dapat mengatur proses mental siswa secara lebih efektif (Kim, Park, Moore, & Varma, 2013).

Berdasarkan hasil penelitian terungkap bahwa kemampuan metakognitif berkembang seiring dengan bertambahnya usia dan uniknya perkembangan ini berlangsung secara terus menerus (van der Stel & Veenman, 2014). Oleh karena itu, layak untuk dianalisis bagaimana menumbuhkan kemampuan metakognitif anak-anak sebagai aspek kunci dari pembelajaran mandiri pada tahap awal (Winne & Hadwin, 2008). Terlebih, Tarrant & Holt (2017) dalam bukunya menjelaskan tentang bagaimana mengembangkan pendekatan metakognitif pada siswa sekolah dasar. Anak akan memiliki kemampuan metakogniif jika mulai dari kelas rendah anak sudah dibiasakan terlibat dalam aktivitas metakognitif. Bahkan negara berkembang termasuk Indonesia telah menetapkan kebijakan dimana aspek metakognitif menjadi salah satu komponen penting dalam standar kompetensi lulusan pendidikan dasar.

Penelitian sebelumnya telah mengungkapkan bahwa keterampilan metakognitif siswa di Indonesia masih berada pada level paling rendah (Prayitno, 2011; Suratno, 2009; hastuti et al., 2019). Bahkan kemampuan metakognitif calon guru SD juga masih berada pada level rendah

(Hastuti & Haifaturrahmah, 2018). Fakta ini sangat menyedihkan, karena aktivitas metakognitif adalah indikator kuat perkembangan kognitif seseorang dan penentu dalam tercapainya tujuan pembelajaran. Rendahnya kemampuan metakognitif di sekolah dasar dikhawatirkan akan berdampak pada rendahnya kemampuan metakognitif untuk jenjang pendidikan berikutnya sehingga permasalahan ini perlu dicarikan solusi.

Salah satu faktor yang menyebabkan rendahnya kemampuan metakognitif siswa adalah kegiatan belajar yang dirancang masih berpusat pada guru dan menekankan pada aspek kognitif. Selain itu, siswa hanya dilibatkan pada soal-soal rutin atau soal-soal yang bukan pemecahan masalah, sehingga soal-soal rutin ini belum mampu melatih siswa untuk berpikir tingkat tinggi. Kebiasaan belajar yang berpusat pada guru diyakini akan menghasilkan siswa yang pasif sehingga tidak ada keterlibatan aktivitas metakognitif siswa (Rahmat & Chanunan, 2018). Selain itu metakognisi berhubungan erat dengan pemecahan masalah, metakognisi muncul ketika seseorang menemui masalah yang tidak dikenal, ketidakpastian, pertanyaan, atau dilema (King, Goodson, & Rohani, 1993:1).

Solusi untuk meningkatkan kemampuan metakognitif siswa salah satunya adalah melalui aktivitas belajar yang berpusat pada siswa seperti model pembelajaran inkuiri. Model pembelajaran inkuiri mengacu pada paradigma konstruktivisme, dimana siswa secara aktif mengkonstruk sendiri pengetahuan mereka. Aktivitas pembelajaran inkuiri dirancang menyerupai aktivitas seorang saintis, dimana siswa terlibat untuk mempertanyakan, menganalisis ide-ide, merancang strategi, dan membahas hasil serta makna hasilnya (Ellwood & Abrams, 2018). Melalui kegiatan inkuiri, siswa membangun pengetahuan mereka secara aktif sehingga hasil belajar yang diinginkan dapat tercapai. Pada kegiatan pembelajaran inkuiri, para siswa terlibat dalam kegiatan-kegiatan yang pada dasarnya terbuka, berpusat pada siswa, dan langsung berdasarkan pada masalah-masalah kehidupan nyata. Pembelajaran inkuiri dipandang sebagai pembelajaran yang terjadi ketika pelajar membangun pemahaman tentang informasi baru dengan mengaitkannya dengan pengetahuan sebelumnya sehingga koneksi dengan pengetahuan dan pengalaman siswa sebelumnya juga memainkan peran penting dalam aktivitas pembelajaran inkuiri (Rooney, 2009).

Pembelajaran inkuiri dibagi menjadi tiga tipe yaitu 1) inkuiri terstruktur, 2) inkuiri terbimbing, dan 3) inkuiri terbuka. Jenis pembelajaran inkuiri yang cocok untuk siswa sekolah dasar adalah pembelajaran inkuiri terbimbing karena mereka belum memiliki banyak pengalaman dalam pembelajaran inkuiri (Suastra, 2017; Margunayasa., et al; 2018). Inkuiri terbimbing menekankan pentingnya proses penemuan oleh siswa sendiri. Inkuiri terbimbing memiliki enam tahapan yaitu 1) orientasi, 2) perumusan masalah, 3) penentuan hipotesis, 4) pengumpulan data, 5) verifikasi hasil/pengujian hipotesis, dan 6) penarikan kesimpulan.

Penelitian sebelumnya telah membuktikan bahwa pembelajaran berbasis inkuiri juga dapat meningkatkan keterampilan berpikir kritis siswa (Thaiposri & Wannapiroon, 2015; Prayogi, Yuanita, & Wasis, 2018). Terlebih penelitian yang dilakukan oleh Ergul at al (2011) juga menunjukkan bahwa penggunaan metode pengajaran inkuiri terbimbing secara signifikan dapat meningkatkan keterampilan dan sikap proses sains pada siswa sekolah dasar. Model pembelajaran inkuiri sudah cukup populer memainkan peran penting untuk mendukung kemampuan berpikir tingkat tinggi di berbagai bidang, khususnya dalam sains dan matematika (Hayes, 2002; Rooney, 2009; Towers, 2010). Banyak peneliti percaya bahwa menumbuhkan pemikiran tingkat tinggi di kalangan siswa dari segala usia adalah tujuan pendidikan yang utama dan pemikiran tingkat tinggi adalah elemen penting dari kesuksesan hidup (Gough, 1991; Zohar et al, 2001; Sousa, 2008). Pembelajaran inkuiri juga dapat membantu siswa mengembangkan kemampuan metakognitif (Kuhlthau, 2010; Seraphin., et al, 2012). Meskipun ada banyak penelitian yang menyelidiki pengaruh inkuiri terbimbing terhadap kemampuan berpikir tingkat tinggi termasuk metakognisi, namun penelitian tersebut terbatas dan belum menyelidiki tentang pengaruh inkuiri terbimbing pada kemampuan metakognitif siswa sekolah dasar. Selanjutnya, penelitian ini akan memberikan kontribusi yang berharga untuk literatur pendidikan matematika khususnya di sekolah dasar dalam hal penerapan inkuiri terbimbing

pada kemampuan metakognitif. Dalam studi ini, peneliti mencoba untuk menganalisis perbedaan kemampuan metakognitif antara siswa sekolah dasar yang belajar melalui model pembelajaran inkuiri terbimbing dan mereka yang belajar melalui model pembelajaran konvensional.

METODE

Penelitian ini menggunakan metode kuantitatif. Tujuannya adalah untuk menganalisis data yang diambil dari tes kemampuan metakognitif siswa sekolah dasar setelah penerapan inkuiri terbimbing. Untuk mengetahui secara mendalam pengaruh implementasi inkuiri terbimbing, semua siswa dalam kelompok eksperimen diamati. Penelitian ini menyelidiki dua variabel, terdiri dari penerapan inkuiri terbimbing sebagai variabel independen dan tes kemampuan metakognitif siswa dalam memecahkan masalah KPK dan FPB sebagai variabel dependen. Untuk mengetahui secara mendalam pengaruh implementasi inkuiri terbimbing, semua siswa kelompok eksperimen diamati, dan memilih beberapa siswa untuk diwawancarai tentang proses menyelesaikan masalah pecahan.

Tahapan inkuiri terbimbing dalam penelitian ini menggunakan enam tahap yaitu 1) orientasi, 2) perumusan masalah, 3) penentuan hipotesis, 4) pengumpulan data, 5) verifikasi hasil/pengujian hipotesis, dan 6) penarikan kesimpulan. Model pengajaran konvensional dalam penelitian ini adalah mentransfer pengetahuan dari guru ke siswa yang biasanya dimulai dengan penjelasan singkat guru tentang materi pecahan dan berlanjut dengan siswa mencoba menjawab beberapa masalah dalam buku atau masalah dari guru dan berakhir dengan presentasi jawaban. Karakteristik model pengajaran konvensional adalah kecenderungan dalam mendominasi kegiatan mengajar, transfer pengetahuan dari guru ke siswa, kegiatan belajar cenderung monoton, komunikasi satu arah, banyak latihan dalam menyelesaikan masalah dan pengajaran yang berpusat pada guru.

Desain eksperimental dari penelitian ini adalah menyiapkan dua kelompok kelas, yaitu kelas eksperimen dan kelas kontrol, yang dipilih secara purposive random sampling dan diperiksa dengan pre-test dan post-test dengan menggunakan desain seperti Tabel 1 berikut.

Tabel. 1

Equivalent pre-test and post-test control group design

Group	Pre test	Treatment	Pos test
A (n=28)	O1	X	O2
B (n=27)	O3	-	O4

Tabel 1 menunjukkan bahwa A adalah kelompok eksperimen menerapkan inkuiri terbimbing, dan B mewakili kelompok control menerapkan pembelajaran konvensional. O1 dan O3 adalah kedua kelompok yang yang berada pada kemampuan metakognitif yang sama dan diuji menggunakan pre test. O2 adalah hasil dari kelompok eksperimen, sedangkan O4 adalah hasil dari kelompok kontrol. Dalam penelitian ini pengaruh dari treatment di analisis menggunakan uji-t. Pada Gambar 1, menunjukkan mode triangulasi di mana data kualitatif di triangulasi dengan data kuantitatif untuk mengetahui efek inkuiri terbimbing dalam meningkatkan kemampuan metakognitif siswa dalam menyelesaikan masalah KPK dan FPB.

Populasi penelitian ini adalah siswa kelas empat sekolah dasar yang berada di SDN 13 Ampenan Kota Mataram Nusa Tenggara Barat Indonesia. Penelitian ini menerapkan cluster sampling dengan memilih dua kelas secara acak, menghasilkan satu kelas eksperimen dengan jumlah 29 siswa yang diajarkan menggunakan inkuiri terbimbing. Kelas kontrol, diajarkan menggunakan model pembelajaran konvensional dengan jumlah siswa 28.

Eksperimen dilakukan selama 6 periode pembelajaran matematika, tidak termasuk pre test dan post-test. Langkah pertama adalah menyiapkan dua kelompok kelas, yaitu kelas eksperimen dan kelas kontrol, yang dipilih secara purposive random sampling. Ada dua kelompok kelas yang diselidiki yaitu: kelas A sebagai kelompok eksperimen dan diterapkan pembelajaran inkuiri dan kelas B sebagai kelompok kontrol dan diterapkan metode

konvensional. Langkah kedua adalah pemberian pre test pada masing-masing kelompok kelas yaitu eksperimen dan kontrol.

Langkah selanjutnya adalah proses validasi. Ada dua ahli pendidikan matematika yang memvalidasi rencana pelaksanaan pembelajaran inkuiri terbimbing, lembar kerja siswa, dan soal pre test serta post test yang memuat pemecahan masalah KPK dan FPB. Langkah keempat adalah proses treatment/perlakuan. Pada langkah ini, peneliti bertindak sebagai guru. Di kelas eksperimen, para siswa dilibatkan dalam kegiatan belajar inkuiri terbimbing. Di kelas kontrol, siswa diajarkan menggunakan metode konvensional. Langkah kelima adalah pemberian post-test.

Pengumpulan data dilakukan dengan menggunakan instrumen penelitian berupa rencana pelaksanaan pembelajaran (lesson plan) inkuiri terbimbing, lembar kerja siswa, tes pemecahan masalah matematika materi KPK dan FPB, dan wawancara. Tes pemecahan masalah matematika materi KPK dan FPB digunakan untuk mengumpulkan data kemampuan metakognitif siswa. Wawancara yang digunakan adalah wawancara tidak terstruktur dengan tujuan untuk memahami dan mendalami kemampuan metakognitif yang dilakukan oleh siswa dalam menyelesaikan masalah KPK dan FPB

Siswa dalam kelompok eksperimen dan kontrol diberikan soal problem solving tentang materi KPK dan FPB saat pre test dan post tes. Data kualitatif dikumpulkan melalui wawancara tidak terstruktur berbasis hasil pekerjaan siswa saat post test. Statistik yang digunakan adalah statistik deskriptif dan inferensial untuk menganalisis data kuantitatif. Statistik deskriptif digunakan untuk menunjukkan rata-rata dan standar deviasi, sedangkan statistik inferensial independet-sample t-test untuk menguji keefektifan inkuiri terbimbing antara kelas eksperimen dan kelas kontrol (Hilton et al, 2004). Taraf signifikansi yang digunakan untuk membandingkan skor rata-rata dari kelas eksperimen dan kontrol yaitu taraf signifikansi 5%.

HASIL DAN PEMBAHASAN

Uji normalitas data diperiksa sebelum dianalisis lebih lanjut. Jumlah responden adalah 55 siswa. Ini menunjukkan bahwa hasil pre-test dari kedua kelas baik kelas eksperimen maupun kelas kontrol adalah setara atau tidak berbeda secara signifikan, seperti yang terlihat pada Tabel 2 dan Tabel 3.

Table 2
The table displays pre-test results and mean values between the control class and the experimental class.

Group	N	Mean	Std.Deviation	Std.Error Mean
Experimental Class	29	4.72	1.771	.329
Control Class	28	4.39	1.707	.323

Nilai rata-rata di kelas eksperimen 4.72 (SD = 1,771), sedangkan kelas kontrol ditandai dengan skor rata-rata 4.39 (SD = 1.707). Perbedaan skor pre-test antara kedua kelompok adalah [t (55) = 0.887, p > 0,05], berarti tidak signifikan pada tingkat alpha .05. Ini menunjukkan bahwa kedua kelompok setara sebelum treatment.

Table 3
The data below presents the comparison of pre-test score of experiment class and control class score using independent sample t-test

Levene's Test for Equality of Variances	t-test for Equality of Means

		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pre test	Equal variances assumed	.020	.887	.719	55	.475	.331	.461	-.592	1.255
	Equal variances not assumed			.719	55.000	.475	.331	.461	-.592	1.254

Table 4
The table displays post-test results and mean values between the control class and the experimental class.

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental class	29	8.59	1.991	.370
Control class	28	7.07	1.359	.257

Tabel 4 menunjukkan hasil post-test kelas eksperimen, rata-rata 8.59 (SD = 1,991), sedangkan kelas kontrol rata-rata 7.07 (SD = 1,359). Selanjutnya, Tabel 5 menunjukkan bahwa pada uji-t sig (2-tailed) dari uji-t sampel independen post-test adalah 0.001 (p = <0,05), sehingga signifikan. Ini menunjukkan bahwa kedua kelas ada perbedaan pada kemampuan metakognitif siswa dalam menyelesaikan masalah pecahan setelah penerapan inkuiri terbimbing. Berdasarkan hasil ini, dapat disimpulkan bahwa ada pengaruh yang signifikan dari penerapan model pembelajaran inkuiri terbimbing dalam meningkatkan kemampuan metakognitif siswa dalam menyelesaikan masalah KPK dan FPB.

Table 5
The data below presents the comparison of post-test score of experiment class and control class score using independent sample t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Post test	Equal variances assumed	4.382	.41	3.343	55	.001	1.515	.453	.607	2.423
	Equal variances not assumed			3.365	49.565	.001	1.515	.450	.610	2.419

Berdasarkan hasil jawaban siswa dalam menyelesaikan masalah KPK dan FPB, diperoleh data tentang kemampuan metakognitif siswa. Pada kelas eksperimen, aktivitas metakognitif muncul saat siswa menyelesaikan masalah matematika materi KPK dan FPB. Pembelajaran inkuiri terbimbing mendorong siswa untuk lebih terlibat aktif dalam kegiatan belajar matematika. Tahapan dalam model pembelajaran inkuiri terbimbing mampu memunculkan aspek kemampuan metakognitif. Tahapan inkuiri terbimbing dalam penelitian ini menggunakan enam tahap yaitu 1) orientasi, 2) perumusan masalah, 3) penentuan hipotesis, 4) pengumpulan data, 5) verifikasi hasil/pengujian hipotesis, dan 6) penarikan kesimpulan.

Pada tahap orientasi, guru melakukan apersepsi dan mengaitkan materi yang akan dipelajari dengan materi sebelumnya yaitu tentang pengenalan kelipatan dan faktor. Pada tahap ini ada beberapa kendala yang dihadapi peneliti karena konsep awal siswa mengenai materi

KPK dan FPB di kelas 4 masih lemah, sehingga perlu kerja keras untuk menstimulus kembali pengetahuan sebelumnya. Sebelum masuk pada materi, siswa menerima informasi tentang kompetensi dasar dan tujuan pembelajaran yang akan dicapai, ruang lingkup materi, langkah pembelajaran, serta tahap-tahap metode pembelajaran inkuiri. Sebagian besar interaksi yang terjadi pada tahap orientasi adalah interaksi antar siswa dengan guru (peneliti sendiri), dimana aktivitas menyiapkan peserta didik secara fisik dan psikis melalui apersepsi juga dapat mendorong munculnya aktivitas metakognitif. Elbers (2003) juga menyatakan bahwa interaksi dalam pembelajaran di kelas mendorong terjadinya proses refleksi.

Pada tahap pemberian masalah, siswa diberikan permasalahan dalam menentukan KPK dan FPB melalui lembar kerja siswa yang telah disusun peneliti. Siswa diminta untuk berkelompok 3-4 orang sesusai kelompok yang ditentukan oleh guru dan meminta mereka untuk mempelajari semua petunjuk yang ada pada lembar kerja. Pada tahap ini setiap kelompok juga difasilitasi media pembelajaran uang koin. Penggunaan media ini bertujuan untuk membantu siswa mengantarkan konsep KPK dan FPB. Petunjuk penggunaan media ini juga tercantum dalam lembar kerja siswa. Sejalan dengan penelitian yang dilakukan oleh Ellwood & Abrams (2018), interaksi siswa terlebih dalam diskusi kelompok akan saling memberikan umpan balik dan meningkatkan motivasi siswa serta hasil pencapaian. Hastuti dan Sutarto (2017) menegaskan bahwa anak sekolah dasar belum mampu berpikir secara abstrak, sehingga perlu ada media belajar untuk dapat mengantarkan konsep.

Pada tahap menyusun hipotesis, banyak aktivitas menanya yang muncul dalam anggota kelompok, seperti siswa menanyakan tentang bagaimana cara menentukan KPK dan FPB dari dua bilangan. Siswa saling bertanya pada teman satu kelompoknya bahkan siswa juga bertanya pada guru. Setelah siswa mempertanyakan, siswa akan membuat hipotesis tentang bagaimana cara menentukan KPK dan FPB. Pada tahap ini, ada beberapa kendala yang dialami peneliti, seperti kemampuan literasi siswa yang masih kurang, siswa lebih banyak bertanya pada guru daripada membaca dan mencari tahu sendiri. Namun, guru tetap membiasakan siswa untuk membaca berulang ulang dan memahami lembar kerja yang diberikan mulai dari pertemuan pertama hingga terakhir sehingga siswa akan melatih kemampuan literasi siswa juga. Interaksi yang terjadi pada tahap ini adalah interaksi antar siswa dengan siswa, siswa dengan sumber belajar (lembar kerja siswa, buku paket, dan uang koin), dan siswa dengan guru (peneliti sendiri), dimana interaksi ini mendorong munculnya aktivitas metakognitif. Aktivitas metakognitif muncul, saat siswa belajar mempertanyakan dan mengevaluasi pendapat teman dalam kelompok. Sejalan dengan penelitian Chiu & Kuo (2010), metakognisi sosial dalam diskusi kelompok dapat mengonstruksi pengetahuan dan strategi siswa sehingga dapat membantu siswa belajar serta mengevaluasi strategi. Interaksi sosial siswa yang terjadi dalam pembelajaran inkuiri, seperti terlibat dalam diskusi, mempertanyakan, dan menganalisis ide-ide akan meningkatkan motivasi dan berpikir kritis (Ellwood & Abrams, 2018)

Selanjutnya pada tahap pengumpulan data, anggota kelompok satu mulai mencoba menentukan KPK dan FPB menggunakan uang koin. Mereka juga mulai menjawab semua pertanyaan dalam lembar kerja siswa. Dalam pengamatan selama kegiatan ini, ditemukan bahwa ada beberapa kesulitan yang dialami kelompok, misal siswa kurang mengerti dengan panduan penggunaan media pada lembar kerja siswa, akan tetapi guru tetap memberikan arahan agar siswa paham dan menemukan sendiri. Selebihnya, anak antusias dalam kegiatan ini dan ketika mereka merasa kesulitan, mereka bertanya pada guru. Berdasarkan hasil pengamatan dan wawancara, anak lebih semangat belajar karena mereka merasa lebih dilibatkan dalam kegiatan mengutak atik uang koin dan saling berdiskusi. Sejalan dengan temuan Elbers (2003), interaksi dalam pembelajaran inkuiri akan merangsang anak untuk mengonstruksi pengetahuan matematika dan mendorong anak untuk melakukan proses refleksi.

Selanjutnya pada tahap pengujian hipotesis, siswa mulai mengecek kembali apakah hasil hipotesis yang mereka buat terkait penentuan KPK dan FPB cocok dengan hasil eksperimen mereka ketika menggunakan media uang koin. Pada tahap ini terjadi interaksi antar siswa dengan siswa, siswa dengan sumber belajar, dan siswa dengan guru, dimana interaksi ini

mendorong munculnya aktivitas metakognitif. Dari hasil temuan, untuk menentukan KPK adalah dengan mencari kelipatan dari masing-masing bilangan, mencari kelipatan persekutuan, dan menentukan kelipatan persekutuan terkecil. Selanjutnya untuk menentukan FPB adalah dengan mencari faktor dari masing-masing bilangan, mencari faktor persekutuan, dan menentukan faktor persekutuan terbesar. Pada tahap ini, anak melakukan aktivitas metakognitif, dimana dia mengevaluasi memikirkan kembali masukan dari temannya kemudian dia merubah kembali jawaban awalnya. Ini konsisten dengan penelitian Hurme, Marenluoto, & Jarvela (2009) bahwa metakognisi lebih muncul ketika terjadi dalam diskusi kelompok dimana salah satu anggota kelompok memberikan kontribusi dan pengaruh pada anggota lain sehingga anggota yang lain dalam kelompok merespon dan mengembangkannya.

Pada tahap kesimpulan, siswa menyimpulkan bahwa untuk menentukan KPK adalah dengan mencari kelipatan dari masing-masing bilangan, mencari kelipatan persekutuan, dan menentukan kelipatan persekutuan terkecil. Selanjutnya untuk menentukan FPB adalah dengan mencari faktor dari masing-masing bilangan, mencari faktor persekutuan, dan menentukan faktor persekutuan terbesar. Selanjutnya pada tahap refleksi, siswa diminta untuk mendeskripsikan kesulitan yang ditemui dan bagaimana cara mengatasinya. Sebagian besar siswa mengungkapkan bahwa mereka kesulitan dalam menentukan KPK dan FPB yang nilainya besar karena pada soal ini tidak mungkin mereka menggunakan media uang koin. Untuk menentukan KPK dan FPB yang nilainya besar, siswa perlu dibimbing untuk dapat membawa dari hal yang konkret menuju ke abstrak (dari penggunaan media menuju konsep yang abstrak). Setelah diberi arahan guru, mereka dapat menyimpulkan bagaimana menentuka KPK dan FPB.

CONCLUSION (12pt, Times New Roman)

Berdasarkan analisis data dan hasil temuan dapat disimpulkan bahwa pembelajaran inkuiri terbimbing dapat meningkatkan kemampuan metakognitif siswa daripada penggunaan metode konvensional. Setiap tahapan dalam pembelajaran inkuiri mampu mendorong aktivitas metakognitif siswa terlebih ketika siswa dilibatkan dalam diskusi kelompok. Adapun saran untuk penelitian selanjutnya adalah: guru sekolah dasar perlu menerapkan pembelajaran inkuiri terbimbing berbantuan media terlebih pada pembelajaran matematika. Selain itu, untuk peneliti selanjutnya disarankan agar dapat menerapkan pembelajaran inkuiri terbimbing dalam topik matematika lainnya.

RECOMMENDATION (12pt, Times New Roman)

Adapun saran untuk penelitian selanjutnya adalah: guru sekolah dasar perlu menerapkan pembelajaran inkuiri terbimbing berbantuan media terlebih pada pembelajaran matematika. Selain itu, untuk peneliti selanjutnya disarankan agar dapat menerapkan pembelajaran inkuiri terbimbing dalam topik matematika lainnya..

UCAPAN TERIMA KASIH

Ucapan terimakasih kami ucapkan pad LPPM Universitas Muhammadiyah Mataram yang telah mendanai penelitian ini.

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Sutarto

by Fpmipa Undikma

Submission date: 10-Jul-2020 12:04AM (UTC-0400)
Submission ID: 1355652112
File name: del_to_the_Metacognitive_Ability_of_Primary_School_Students.docx (35.62K)
Word count: 3914
Character count: 21510

The Effect of Guided Inquiry Learning Model to the Metacognitive Ability of Primary School Students

Abstract

This study aimed at analyzing the effect of guided inquiry learning to the metacognitive ability of primary school students on the material of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*). The type of study was a mixed-method using quantitative and qualitative methods. There were 55 students of 4th grade used as the subjects of study. Two learning models were compared, namely guided inquiry learning model and conventional learning model. The students' metacognitive ability was measured by means of problem-solving test on the material of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*). The quantitative analysis data used descriptive and inferential statistical tests. According to the results of data analysis, it was discovered that the t-test of sig (2-tailed) from the independent samples t-test of post-test was 0,00 (p = <0,05); this indicated that there was a significant difference on it. This showed that there was a difference of students' metacognitive ability for both classes in solving the problems of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*) after the guided inquiry learning was implemented. Consequently, it can be concluded that there is a significant effect on the implementation of guided inquiry learning model to improve the students' metacognitive ability in solving the material problems of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*).

Keywords: *guided Inquiry; Metacognitive Ability; Primary School.*

INTRODUCTION

Students' metacognitive ability is one of indicators which determines the achievement of learning objectives. The involvement of metacognitive ability becomes one of important components on the learning activities since it can encourage high level of thinking ability (Kuzle, 2013; Biryukov, 2014; Wismath, Orr, & Good, 2014). Metacognition is one part of high level of thinking ability which covers up understanding, analysis, and control of cognitive process (Dorr & Perels, 2019; Flavell, Miller, & Miller, 2002). Metacognition also can be defined as an ability to think what has been thought that

covers up three activities i.e. awareness, regulation and evaluation (Hastuti, Nusantara, Subanji, & Susanto, 2016). Metacognition involvement can help the students to solve problems since it can regulate the students' mental processes more effectively (Kim, Park, Moore, & Varma, 2013).

Based on the results of study, it revealed that metacognitive abilities develop along with the age and uniquely this development takes place continuously (Stel & Veenman, 2014). Thus, it is feasible to be analyzed about how to cause to emerge the student' metacognitive as the key aspect of independent learning for the initial stage, (Winne & Hadwin, 2008). Moreover, Tarrant & Holt (2017) in his book explain how to develop a metacognitive approach to primary school students. The students will have metacognitive ability if the students are accustomed to being involved in the metacognitive ability since they ware in the low class. Even developing countries, including Indonesia, have established policies where the metacognitive aspect becomes an important component in the standard competency of graduates of primary education (Minister of Education and Culture Regulations No 20 of 2016).

Previous study had revealed that the students' metacognitive skill in Indonesia is still in the lowest level (Prayitno, 2011; Suratno, 2009; Hastuti, Nusantara, Subanji, & Susanto, 2016). Even the metacognitive abilities of primary school teacher candidates are still at a low level (Hastuti & Haifaturrahmah, 2018). In fact, it is very sad since the metacognitive activity is a strong indicator of a person's cognitive development and determinant in achieving the learning goals. It is feared that the low metacognitive abilities in primary schools will have an impact on the low metacognitive abilities for the next level of education so that this problem needs to be sought for a solution.

A learning activity which designed using teacher-centered becomes one of factors that causes low of students' metacognitive ability and the learning emphasizes on the cognitive aspect. Additionally, the students are only involved on the routine items or not problem-solving items, so that the routine items have not been able to train the students to think at a high level. Teacher-centered learning habits are believed to produce passive students; hence, there is no involvement of students' metacognitive activities (Rahmat & Chanunan, 2018). Furthermore, metacognition is closely related to problem-solving, of which metacognition arises when someone encounters an unknown problem, uncertainty, question, or dilemma (King, Goodson, & Rohani, 1993).

Student-centered learning is one of solutions to improve the students' metacognitive ability i.e. inquiry learning model. Inquiry learning refers to a constructivism paradigm, where the students construct their own knowledge actively. The activities of inquiry learning are designed to resemble the activity of a scientist, where the students are involved to question, analyze ideas, design strategies, and discuss the results and the meaning of the results (Ellwood & Abrams, 2018). Through this inquiry learning, the students construct their own knowledge actively so that the learning outcomes desired can be reached. On the inquiry learning activities, the students are involved on the activities that basically are open, student-centered, and directly based on the real-life problems. The inquiry learning is considered as a learning that comes when the students construct their understanding about new information by relating them with previous knowledge and the students' experience; this also plays important role in the inquiry learning activities (Rooney, 2009).

The inquiry learning is divided into three types, 1) structured inquiry, 2) guided inquiry, and 3) open inquiry. Guided inquiry learning is suitable for the primary school students since the students do not have much experiences in the inquiry learning (Suastra, 2017; Margunayasa., et al; 2018). The guided inquiry learning emphasizes on the importance of discovery processes by the students. There are six stages of guided inquiry learning i.e. 1) orientation, 2) problem formulation, 3) hypothesis determination, 4) data collection, 5) verification of results/hypothesis testing, and 6) drawing the conclusions.

Previous study had proven that inquiry-based learning can also improve the students' critical thinking ability (Thaiposri & Wannapiroon, 2015; Prayogi, Yuanita, & Wasis, 2018). Moreover, a study conducted by Ergul et al. (2011) also showed that the use of guided inquiry learning can significantly improve the ability and science process behavior of primary school students. The inquiry learning model has been quite popular in playing an important role to support higher order thinking skills in various fields, especially in science and mathematics (Hayes, 2002; Rooney, 2009; Towers, 2010). There are a lot of researchers who believed that the main goal of education is to grow a high level of thinking and the high level of thinking is one of important elements for the life success (Gough, 1991; Zohar, 2001; Sousa, 2008). The inquiry learning can also assist the students to develop their metacognitive ability (Kuhlthau, 2010; Seraphin., et al, 2012). Even though there are a lot of studies which investigate about the effect of guided

inquiry learning to the high level of thinking ability including of metacognition, yet those studies are limited and do not investigate on the effect of guided inquiry learning to the metacognitive ability of primary school students. Furthermore, this study will give valuable contribution for the literature of mathematics education, especially on the primary school about the implementation of guided inquiry learning to the metacognitive ability. In this study, the researcher tries to analyze the difference of metacognitive ability between the primary school students who learn by means of guided inquiry learning and the students who learn by means of conventional learning model.

METHOD

The 5th grade students of State Primary School of 13 Ampenan in Mataram City, West Nusa Tenggara, Indonesia were used as the population of this study. Two classes were chosen randomly for this study, in which it covered up one experimental class consisted of 28 students; they were taught using guided inquiry learning and the control class that consisted of 27 students, of which students were taught using a conventional learning model.

This study used a combination method of quantitative and qualitative (mixed-method). Quantitative method was used to analyze the data taken from the metacognitive ability test of primary school students after being implemented using guided inquiry learning. Then, qualitative method was implemented to analyze the data taken from the observation both of during the class learning and also group discussion, students' test results, and interview with the students who were chosen to dig up more information about their metacognitive ability. To discover deeply about the effect of guided inquiry learning, all of the students on the experimental and control groups were observed and interviewed about their processes in solving the problems of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*).

The instruments used in this study covered up Lesson Plan (*RPP*), student worksheet, mathematical problem-solving test using the material of Least Common Multiple (*KPK*) and Greatest Common Divisor (*FPB*), and interview. The mathematical problem-solving test was used to collect the data of students' metacognitive ability. The problems of *KPK* dan *FPB* consisted of questions that integrated with the indicators of

metacognitive ability i.e. planning, observing, and evaluation (Krathwohl, 2002). The indicators and description of metacognitive ability could be seen in the Table 1.

Table 1 The Indicators and Description of Metacognitive Ability

No	Indicators	Description
1	Plan	• Established the goals (P1) • Utilized relevant resources (P2) • Chose appropriate strategies (P3)
2	Evaluation	• Determined someone's understanding level (E1) • How to choose appropriate strategies (E2)
3	Monitoring	• Checked someone's progress (M1) • Chose appropriate strategies of improvement when the strategy chosen did not work. (M2)

The metacognitive ability rubric consisted of seven scales (0-7) that covered up: (1) answers in their own words, (2) coherent sequence of answers, (3) grammar, (4) reason (analysis/evaluation, creation), and (5) answers (true/lacking/not really/blank) (Corebima, 2009).

Furthermore, the experimental design of this study was by preparing two group of classes, namely experimental and control classes using the design shown in the Table 2:

Table. 2 Equivalent pre-test and post-test control group design

Group	Pre test	Treatment	Pos test
A (n=28)	O1	X	O2
B (n=27)	O3	-	O4

The Table 2 showed that A was the experimental group who implemented the guided inquiry learning, and B represented the control group who implemented the conventional learning. O1 and O3 were two groups that were in the similar metacognitive ability and those were tested using pre-test. O2 was the results of experimental group, while the O4 was the result of the control group. in this study, the effect of treatment was analyzed through the t-test.

The experiment had been carried out in 6 meetings, not including pre-test and post-test. The first stage was to prepare two class groups: the experimental class and the control class. Class A was an experimental group, in which the guided inquiry learning was implemented, while the Class B functioned as a control group taught by a conventional method. The second stage was to give pre-test for both groups. The third stage was the validation process. There were two mathematics education experts who validated the plans to implement the guided inquiry learning, the student worksheets, and pre-test and post-test questions that contained the problem-solving of the *KPK* and *FPB*. The fourth stage was the treatment process. In this stage, the researcher had a role as a teacher. In the experimental class, the students were involved in guided inquiry learning activities. Meanwhile, in the control class, the students were taught using a conventional method. Providing a post-test was the fifth stage. In this stage, the students' metacognitive ability was analyzed.

Problem-solving questions about the *KPK* and *FPB* were given to the students of experimental and control groups during the pre-test and post-test. The qualitative data were collected through unstructured interviews based on the students' work during the post-test. Statistical analysis was descriptive and inferential, in which it was used to analyze the quantitative data. The descriptive statistics was used to display the mean and the standard deviation, while the inferential statistics was independent sample t-test to test the effectiveness of guided inquiry learning between the experimental class and the control class (Hilton et. Al., 2004). The significance level used to compare the average scores of the experimental and control classes was the significance level of 5%.

RESULTS AND DISCUSSION

The independent sample t-test was used to test the effectiveness of guided inquiry learning between the experimental and control classes. The data normality test was checked before further analysis was carried out. There were 55 students used as the respondents. As seen from the Table 3 and Table 4, the results of pre-test for the experimental and control classes were the same or there was no significant difference. This assessment referred to the assessment rubric to measure the metacognitive ability, in which the rubric was developed by Corebima (2009).

Table 3 The Results of Pre-Test and Average Scores Between the Control Class and Experimental Class

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental Class	29	4.72	1.771	.329
Control Class	28	4.39	1.707	.323

The average scores of experimental class were 4.72 (SD = 1,771), while the control class was marked with the average scores of 4.39 (SD = 1.707). The pre-test score difference between both groups was [t (55) = 0.887, p > 0,05], it meant that it was not significant on the alpha level of .05. this indicated that both groups were equivalent before the treatment.

Table 4. The Comparation of Pre-Test Scores of Experimental Class and Control Class Score Using the Independent Sample T-Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pre test	Equal variances assumed	.020	.887	.719	55	.475	.331	.461	-.592	1.255
	Equal variances not assumed			.719	55.000	.475	.331	.461	-.592	1.254

Table 5. The results of Post-Test and the Average Scores Between the Control Class and Experimental Class

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental class	29	8.59	1.991	.370
Control class	28	7.07	1.359	.257

The Table 5 indicated the results of post-test from the experimental class, the average scores were 8.59 (SD = 1,991), while the average scores for the control class were 7.07 (SD = 1,359). Furthermore, the Table 6 showed that the t-test of sig (2-tailed) from the independent sample t-test of post-test was 0.001 (p = <0,05); thus, it was significant. This indicated that there was difference in both of classes about the students' metacognitive ability to solve the problems of *KPK* and *FPB* after implementing the guided inquiry learning. Departing from these results, it could be concluded that there was a significant effect on the implementation of guided inquiry learning model to improve the students' metacognitive inquiry learning in solving the problems of *KPK* and *FPB*.

Table 6. The Comparation of Post-Test Scores of Experimental Class and Control Class Score Using the Independent Sample T-Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Post test	Equal variances assumed	4.382	.41	3.343	55	.001	1.515	.453	.607	2.423
	Equal variances not assumed			3.365	49.565	.001	1.515	.450	.610	2.419

Referring to the students' answer results in solving the problems of *KPK* and *FPB*, it was obtained the data about the students' metacognitive ability. In the experimental class, the metacognitive activities arose when the students solved the mathematics problems on the material of *KPK* and *FPB*. The guided inquiry learning encouraged the students to be involved actively in the mathematics learning activities. The guided inquiry learning stages could arise the aspect of metacognitive ability. There were six stages of

guided inquiry learning in this study, in which it covered up 1) orientation, 2) problems formulation, 3) hypothesis determination, 4) data collection, 5) verification of results/hypothesis testing, and 6) drawing the conclusions

In the orientation stage, the teacher did the apperception and material associating that would be learned before, in which it was about the introduction of multiple and divisor. In this stage, there were several obstacles faced up by the researcher since in the students' initial concept about multiple and divisor material was still low; thus, it needed a hard-working to re-stimulate previous knowledge. Before going to the material, the students gained information about the basic competencies and learning objectives that would be reached, the scope of the material, the learning stages, and the stages of inquiry learning method. Most of the interaction occurred on the orientation stage was the interaction between the students and the teacher (the researcher), where the activities to prepare the students physically and psychologically through the apperception also could encourage the metacognitive activities. Elbers (2003) also asserted that the interaction in learning of the classroom encouraged the reflection process.

In the problem distribution stage, the students were given the problems in determining the *KPK* and *FPB* by means of student worksheets that had been arranged by the researcher. The students were asked to group for 3 to 4 people after the group specified by the teacher and asked them to learn all of the instructions in the worksheet. In this stage, each group was also facilitated by using the learning media of coins. The use of media aimed at assisting the students to introduce the concept of *KPK* and *FPB*. The guideline of media usage was also listed in the student worksheet. It was in line with a study conducted by Ellwood & Abrams (2018), the students' interaction especially in group discussions would give each other feedback and increase the students' motivation and achievement results. Hastuti and Sutarto (2017) clarified that primary school students had not been able to think abstractly so that there was a need for learning media to be able to deliver the concepts.

In the stage of preparing the hypothesis, many questioning activities that occurred in the group members, such as the students asking about how to determine the *KPK* and *FPB* of two numbers. The students asked one another in their group even the students also asked the teacher. After the students' question, the students would make hypotheses about how to determine the *KPK* and *FPB*. At this stage, there were several obstacles

experienced by the researcher, such as the students' literacy ability that were still lacking, more students asked the teacher than read and found out for themselves. However, the teacher still accustomed the students to read over and over and understand the worksheets that were given from the first meeting to the last so that the students would practice their literacy skills as well. The interactions that occurred at this stage were the interactions between the students and students, the students with the learning resources (student worksheets, textbooks, and coins), and the students and teachers (the researcher themselves), where these interactions encouraged the emergence of metacognitive activities. The metacognitive activities arose, as the students learned to question and evaluate the opinions of peers in groups. It was in line with Chiu & Kuo's research (2010) which asserted that the social metacognition in group discussions could construct the students' knowledge and strategies so that they could help the students to learn and evaluate the strategies. The student social interactions that occurred in the inquiry learning covered up engaging in discussion, questioning, and analyzing ideas, in which it would increase the motivation and critical thinking (Ellwood & Abrams, 2018).

Furthermore, in the data collection stage, group one members began to try to determine the *KPK* and *FPB* using coins. They also began to answer all questions in the student worksheet. In the observation during this activity, it was found that there were some difficulties experienced by the group, for example the students did not understand the guidelines for using the media on the student worksheets, but the teacher still gave direction so that the students understood and found it themselves. The rest, the students were enthusiastic about this activity and when they felt difficulties, they asked the teacher. Based on the observations and interviews, the students were more enthusiastic about learning since they felt more involved in the activities of fiddling with coins and discussing one another. It was in line with the findings of Elbers (2003) that the interactions in inquiry learning would stimulate the students to construct mathematical knowledge and encourage the students to do the reflection process.

Moreover, in the hypotheses testing stage, the students started to re-check whether the hypotheses results made by the students about the determination of *KPK* and *FPB* was suitable or not with the experimental results when using the media of coins. There was an interaction in this stage such as the interaction between students and students, the students and learning resources, the students and the teacher, where these interactions encouraged

the existence of metacognitive activities. From the finding results, to determine the *KPK* was by finding out the multiples of each number, finding out the multiples of alliances, and determine the least common multiple. Furthermore, to determine the *FPB* was by finding out the factors of each number, looking for the common factor, and determine the greatest common divisor. At this stage, the students engaged in metacognitive activities, where the students evaluated, re-thought the input from their friends then changed their initial answer. This was consistent with a research conducted by Hurme, Marenluoto, & Jarvela (2009) that the metacognition arose more when it occurred in group discussions, in which one group member contributed and influenced other members so that other members in the group responded and developed it.

In the conclusion stage, the students concluded that to determine the *KPK* was by looking for the multiple from each number, looking for the multiples of alliances, and determine the least common multiple. Furthermore, to determine the *FPB* was by finding out the factors of each number, looking for the common factor, and determine the greatest common divisor. Then, in the reflection stage, the students were asked to describe their difficulties encountered and how to overcome them. Most of the students revealed that they had difficulty in determining the *KPK* and *FPB* which were of great value because in this problem it was impossible for them to use coin media. To determine the *KPK* and *FPB* which had great value, the students needed to be guided so that they were able to bring concrete things to the abstract (from the use of media to abstract concepts). After being given a teacher's direction, they could conclude how to determine the *KPK* and *FPB*.

CONCLUSION

Departing from the data analysis and finding results, it can be concluded that the guided inquiry learning can improve the students' metacognitive ability than the use of conventional method. Each stage of inquiry learning is able to encourage the students' metacognitive activities, especially when the students are involved in a group discussion. The suggestion for further studies is: that the primary school teachers are necessary to implement the guided inquiry learning assisted by media, especially on the mathematics learning. Moreover, for the next researchers, it is suggested to be able to implement the guided inquiry learning using other mathematics topics.

RECOMMENDATION

The suggestion for further studies is: that the primary school teachers are necessary to implement the guided inquiry learning assisted by media, especially on the mathematics learning. Moreover, for the next researchers, it is suggested to be able to implement the guided inquiry learning using other mathematics topics.

ACKNOWLEDGMENT

The authors would like to thank the Research and Community Service Institute (*LPPM*) of University of Muhammadiyah Mataram who had funded this study.

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Possessive Review the rules for possessive nouns.

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Proofread This part of the sentence contains an error or misspelling that makes your meaning unclear.

Article Error You may need to remove this article.

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Sentence Cap. Review the rules for capitalization.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voi

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Article Error You may need to use an article before this word. Consider using the article **the**.

Sentence Cap. Review the rules for capitalization.

Missing "," Review the rules for using punctuation marks.

S/V This subject and verb may not agree. Proofread the sentence to make sure the subject agrees v the verb.

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