Halaman Awal Prosiding

AIP Conference Proceedings

scitation.org/journal/apc

Volume 2330 A

The 4th International Conference on Mathematics and Science Education (ICoMSE) 2020

Innovative Research in Science and Mathematics Education in The Disruptive Era

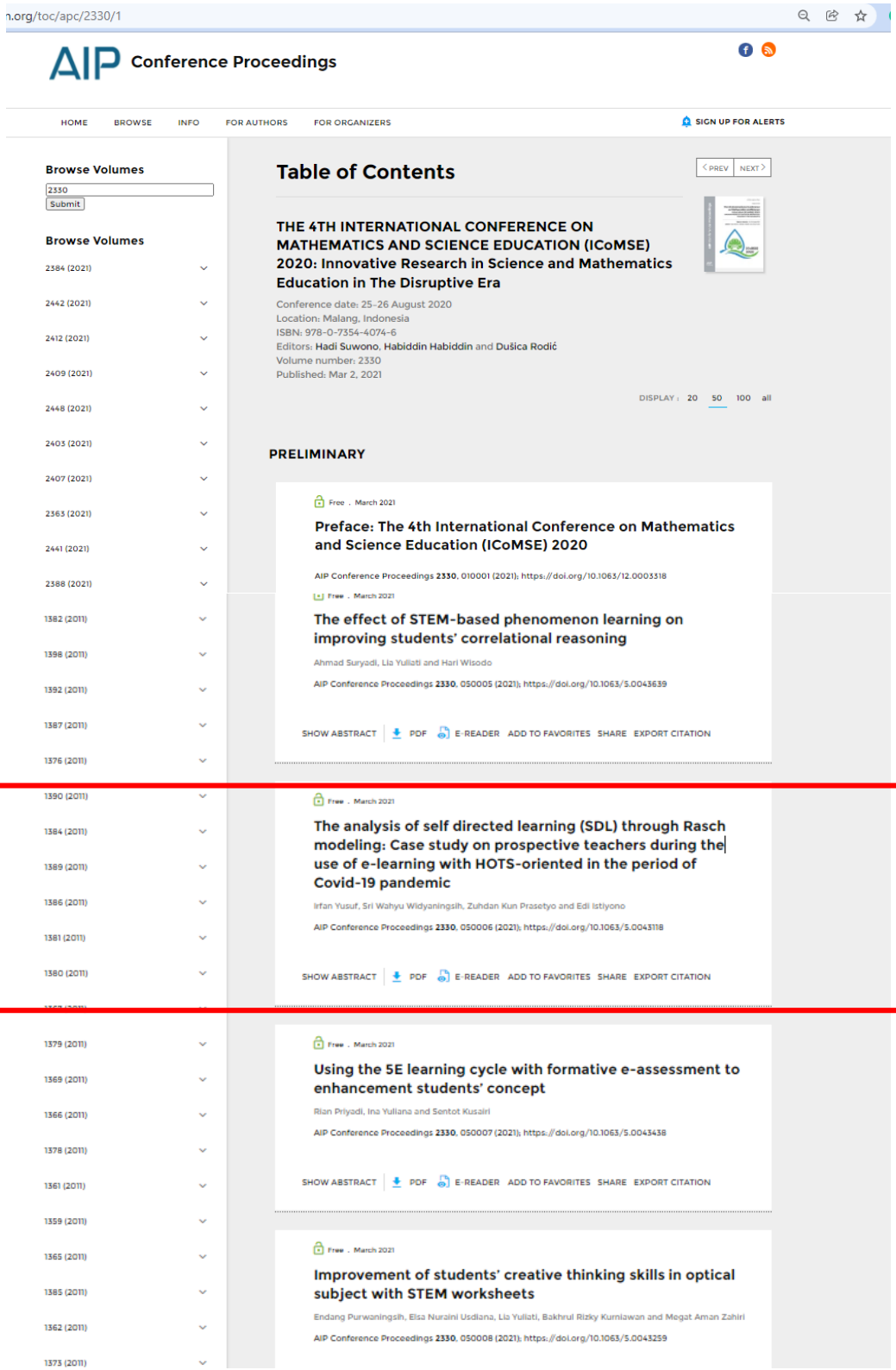
Malang, Indonesia • 25–26 August 2020

Editors • Hadi Suwono, Habiddin Habiddin and Dušica Rodić

ICoMSE 2020

AIP Publishing

Daftar Isi Prosiding (Khusus yang Terdapat Nama Penulis)



n.org/toc/apc/2330/1

AIP Conference Proceedings

HOME BROWSE INFO FOR AUTHORS FOR ORGANIZERS SIGN UP FOR ALERTS

Browse Volumes

2330

Submit

Browse Volumes

2384 (2021)
2442 (2021)
2412 (2021)
2409 (2021)
2448 (2021)
2403 (2021)
2407 (2021)
2363 (2021)
2441 (2021)
2388 (2021)
1382 (2011)
1398 (2011)
1392 (2011)
1387 (2011)
1376 (2011)
1390 (2011)
1384 (2011)
1389 (2011)
1386 (2011)
1381 (2011)
1380 (2011)
1379 (2011)
1369 (2011)
1366 (2011)
1378 (2011)
1361 (2011)
1359 (2011)
1365 (2011)
1385 (2011)
1362 (2011)
1373 (2011)

Table of Contents

PREV NEXT

THE 4TH INTERNATIONAL CONFERENCE ON MATHEMATICS AND SCIENCE EDUCATION (ICoMSE) 2020: Innovative Research in Science and Mathematics Education in The Disruptive Era

Conference date: 25-26 August 2020
Location: Malang, Indonesia
ISBN: 978-0-7354-4074-6
Editors: Hadi Suwono, Habiddin Habiddin and Dušica Rodić
Volume number: 2330
Published: Mar 2, 2021

DISPLAY : 20 50 100 all

PRELIMINARY

Free . March 2021

Preface: The 4th International Conference on Mathematics and Science Education (ICoMSE) 2020

AIP Conference Proceedings 2330, 010001 (2021); https://doi.org/10.1063/12.0003318

Free . March 2021

The effect of STEM-based phenomenon learning on improving students' correlational reasoning

Ahmad Suryadi, Lia Yuliati and Hari Wisodo

AIP Conference Proceedings 2330, 050005 (2021); https://doi.org/10.1063/5.0043639

SHOW ABSTRACT PDF E-READER ADD TO FAVORITES SHARE EXPORT CITATION

Free . March 2021

The analysis of self directed learning (SDL) through Rasch modeling: Case study on prospective teachers during the use of e-learning with HOTS-oriented in the period of Covid-19 pandemic

Irfan Yusuf, Sri Wahyu Widyaningsih, Zuhdan Kun Prasetyo and Edi Istiyono

AIP Conference Proceedings 2330, 050006 (2021); https://doi.org/10.1063/5.0043118

SHOW ABSTRACT PDF E-READER ADD TO FAVORITES SHARE EXPORT CITATION

Free . March 2021

Using the 5E learning cycle with formative e-assessment to enhancement students' concept

Rian Priyadi, Ina Yuliana and Sentot Kusairi

AIP Conference Proceedings 2330, 050007 (2021); https://doi.org/10.1063/5.0043438

SHOW ABSTRACT PDF E-READER ADD TO FAVORITES SHARE EXPORT CITATION

Free . March 2021

Improvement of students' creative thinking skills in optical subject with STEM worksheets

Endang Purwaningsih, Elsa Nuraini Usdiana, Lia Yuliati, Bakhrul Rizky Kurniawan and Megat Aman Zahiri

AIP Conference Proceedings 2330, 050008 (2021); https://doi.org/10.1063/5.0043259

Informasi Seminar

Preface: The 4th International Conference on Mathematics and Science Education (ICoMSE) 2020

The spreading of Covid-19 has drastically impacted all aspects of our lives. All countries, including Indonesia, have applied considerable measures to stop the spreading. With this consideration, we hold the ICoMSE 2020 virtually. This problematic situation is none even a step to demotivate our commitment to follow again in the footsteps of the last highly engaging conferences in 2017, 2018, and 2019. The ICoMSE 2020 theme "Innovative Research in Science and Mathematics Education in The Disruptive Era" should provoke us to rethink the contribution of mathematics and science education as well as mathematics and science research to respond to the current disruptive era, particularly the emerging of the Covid-19 pandemic.

Three hundred twenty-six abstracts, including from several countries, have been submitted. Hundreds of participants shared their experiences in their presentations, offer their insights, point the challenges up, and suggest new solutions regarding the following conference topics: Chemistry Education, Biology Education, Physics Education, Mathematics Education, Science Education, and Mathematics and Science. Among those abstracts, only 273 full papers were submitted to the committee, and finally, only 233 papers were accepted after the following two-step blind review. We do hope that the ideas shared in this proceeding will stimulate the dissemination of valuable knowledge in the relevant area.

Finally, let me conclude by thanking all participants for their time and valuable insights shared in this conference. In particular, I would like to express my highest appreciation and gratitude to the keynote speakers, including:

1. Prof. Peter Grootenboer from Griffith University, Australia
2. Prof. Dr. Chun-Yen Chang from National Taiwan Normal University, Taiwan
3. Dr. Imelda Santos Caleon from Nanyang Technological University, Singapore
4. Assoc. Prof. David Geelan from Griffith University, Australia
5. Dr. Dušica Rodić from The University of Novi Sad, Serbia
6. Bambang Sumintono, Ph.D. from Universiti Malaya, Malaysia
7. Prof. Dr. Sutopo, M.Si from Universitas Negeri Malang, Indonesia

I believe that this conference will catalyze sharing experiences and knowledge in mathematics and science education and build networking between academicians, practitioners, and researchers. This conference has been a chance to promote and share our research results and valuable ideas so everyone who shares common interests can discuss and even adopt it.

Malang, November 2020

Habiddin, PhD
Chairman

Organizing Commitee

Chairman : Habiddin, Ph.D.

Secretary : Muhammad Fajar Marsuki, S.Pd., M.Sc.

Member

1. Dr. Irma Kartika Kusumaningrum, S.Si., M.Si.
2. Nani Farida, S.Si., M.Si, Ph.D.
3. Yessi Affriyenni, S.Pd., M.Sc.
4. Agung Mulyo Setiawan, S.Pd., M.Si.
5. Meyga Evi Ferama Sari, S.Si., M.Si.
6. Dr. Yudhi Utomo, M.Si.

Scientific Committee

1. Prof. Dr. Hadi Suwono, M.Si, Universitas Negeri Malang, Indonesia
2. Prof. Peter Grootenboer, Griffith University, Australia
3. Assoc. Prof. David Geelan, Griffith University, Australia
4. Dr. Chun-Yen Chang, National Taiwan Normal University, Taiwan
5. Dr. Dusica Rodic, University of Novi Sad, Serbia
6. Prof. Lilia Halim, Universiti Kebangsaan Malaysia, Malaysia
7. Prof. Dr. Sri Rahayu, M.Ed., Ph.D., Universitas Negeri Malang, Indonesia
8. Dr. Saeed Almuntasheri, Albaha University, The Kingdom of Saudi Arabia
9. Prof. Suhadi Ibnu, MA., Ph.D., Universitas Negeri Malang, Indonesia
10. Dr. Sc. Anugerah Ricky Wijaya, M.Sc., Universitas Negeri Malang, Indonesia
11. Dr. Sumari, M.Sc., Universitas Negeri Malang, Indonesia
12. Prof. Dr. Sutopo, M.Si, Universitas Negeri Malang, Indonesia
13. Prof. dr. Siti Zubaidah, M.Si, Universitas Negeri Malang, Indonesia
14. Prof. Dr. Cholis Sa'dijah, Universitas Negeri Malang, Indonesia
15. Dr. Lia Yuliati, M.Pd, Universitas Negeri Malang, Indonesia
16. Dr. Sentot Kusairi, M.Si, Universitas Negeri Malang, Indonesia
17. Dr. Parlan, M.Si, Universitas Negeri Malang, Indonesia
18. Dr. Abdul Qohar, Universitas Negeri Malang, Indonesia

Proses Submit dan Revisi oleh Korespondensi Irfan Yusuf

Compose

Mail
Inbox 4,378
Starred
Snoozed
Sent
More

14 of 14

Notification Letter to Submit Abstract

External Inbox ×

icomse2019@um.ac.id
to me

Sun, Jun 14, 2020, 2:43 PM

Dear Irfan Yusuf,
Universitas Papua

We would like to inform you that the deadline for abstract submission is on August 3rd, 2020.
The template is available on the following page https://bit.ly/abstracticomse (for abstract) and https://bit.ly/papericomse (for full paper). Please note that ICoMSE 2020 uses the Vancouver referencing style and accepts the full paper up to 8 pages.

Do not hesitate to contact our committee if you have any questions through the following accounts.
Email: icomse2019@um.ac.id
Contact person:
+62 813-3175-9901 (Nani Farida, S.Si, M.Si, Ph.D)
+62 857-3605-4381 (Yessi Affriyenni, S.Pd, M.Sc)

Please ignore this email if you have submitted your abstract.

Thank you.

Best regards,

ICOMSE 2020 Committee


Notification Letter t...

Chat
Spaces
Meet

Compose

Mail
Inbox 7,618
Starred
Snoozed
Sent
More

5 of 5

Notification of the review result (ICoMSE 2020)

External Inbox ×

Microsoft CMT <email@msr-cmt.org>
to me

Thu, Oct 29, 2020, 8:13 PM

Dear Author(s) for Paper ID: 40

We have reached a decision regarding your submission to the ICoMSE 2020.

The decision is "Major Revision"

Please do the revision accordingly and be informed that how the authors address the reviewer's feedbacks will determine whether your article will be accepted or rejected for AIP publication.
Please also be informed that for the blind review purpose, all author names, emails, and affiliations have been removed. Please submit the revised version of your manuscript before November 5th, 2020 along with all author names, emails, and affiliations.
Please also ensure that your paper conforms to the AIP template.

The reviewer feedbacks can be found in your account: go to author feedbacks then click view reviews. The files attached by the reviewer (if any) are located underneath the reviewers' statement.

To upload your revised version: go to author feedbacks then click post author feedbacks.

Best Regards
ICOMSE 2020 Committee

Chat
Spaces

No spaces yet
Create or find a space

Compose

Mail
Inbox 4,378
Starred
Snoozed
Sent
More

7 of 14

Acceptance of Notification

Inbox ×

Microsoft CMT <email@msr-cmt.org>
to me

Wed, Nov 18, 2020, 5:57 PM

Dear IRFAN YUSUF,
Universitas Papua

I am pleased to inform you that your paper entitled "The Analysis of Self Directed Learning (SDL) through Rasch Modeling: Case Study on Prospective Teachers during the Use of E-Learning with HOTS-oriented in the Period of Covid-19 Pandemic" with paper ID "40" presented to the International Conference on Mathematics and Science Education 2020 has been accepted for AIP proceeding publication. Congratulations!

We would like to inform you that the publication fee is IDR 2,500,000

The deadline for the payment of the publication fee is on 24 November 2020.

The payment can be done through bank transfer to:

Bank BNI
An. Irma Kartika Kusumaningrum
Account number: 0812588691

Please submit the payment proof to https://bit.ly/35AUfBP

Best Regards
Habiddin
Chairman of ICoMSE 2020

Chat
Spaces
Meet
New meeting

The analysis of self directed learning (SDL) through Rasch modeling: Case study on prospective teachers during the use of e-learning with HOTS-oriented in the period of Covid-19 pandemic

Cite as: AIP Conference Proceedings **2330**, 050006 (2021); https://doi.org/10.1063/5.0043118
Published Online: 02 March 2021

Irfan Yusuf, Sri Wahyu Widyaningsih, Zuhdan Kun Prasetyo, Edi Istiyono, et al.

The Analysis of Self Directed Learning (SDL) through Rasch Modeling: Case Study on Prospective Teachers during the Use of e-Learning with HOTS-oriented in the Period of Covid-19 Pandemic

Irfan Yusuf[1, a)], Sri Wahyu Widyaningsih[1, b)], Zuhdan Kun Prasetyo[2, c)], and Edi Istiyono[2, d)]

[1]*Department of Physical Education, Universitas Papua, Jl. Gunung Salju Amban, Manokwari 98314, Indonesia*
[2] *Department of Physical Education, Universitas Negeri Yogyakarta, Jl. Colombo No.1, Karang Malang, Caturtunggal, Kec. Depok, Kab. Sleman, DIY 55281, Indonesia*

[a)]Corresponding author: i.yusuf@unipa.ac.id
[b)]s.widyaningsih@unipa.ac.id
[c)]zuhdan@uny.ac.id
[d)]edi_istiyono@uny.ac.id

Abstract. This study aims to explain how prospective teachers' Self-Directed Learning (SDL) when learning through the media of the Moodle e-learning platform poses various Higher Order Thinking Skill (HOTS) problems. Seventy-seven prospective teachers at the Universitas Papua responded to the SDL questionnaire. Descriptive testing methods by Rasch modeling used as SDL questionnaires which were accessible online through e-learning. This SDL questionnaire had 32 statements with five indicators. The Rasch Model analysis technique was used to test the reliability and validity of the SDL instrument and assessed the student's SDL. The results of the reliability and validity analysis indicated that the SDL instrument was appropriate. The results of univariate analysis of the respondents' approval level showed a logit value greater than 0.00, which meant that students generally agreed to the SDL instrument statements obtained during the use of Moodle e-learning platform with HOTS-oriented. As for some items of statements had a low acceptance rate that was generally related to the students' ability to measure the level of failure in learning. At last, these results can be a reference for lecturers to continue improving the optimization of the use of e-learning, one of which is through the presentation of appropriate evaluation instruments. So the students, especially prospective teachers, have the ability to measure their achievement in learning.

INTRODUCTION

The use of the internet as a learning medium during the Covid-19 pandemic is a necessity (1). Students are required to be able to use internet technology as a social distancing solution recommended by the government (2). The Indonesian government issued a policy that is to temporarily eliminate face-to-face learning and is replaced by online learning, both at the elementary and secondary school level, and at the college level. Higher education institutions in Indonesia respond to the policy by issuing instructions in the form of online learning. No exception at the Universitas Papua, which is one of the state universities located in eastern Indonesia, learning must be carried out online to avoid Covid-19 transmission. Online learning has many benefits, but there are also some constraints, especially in eastern Indonesia. These constraints include the availability of telecommunications infrastructure that has not been evenly distributed and adequate, the process of transforming conventional learning into an online one, and human resource factors. Online learning requires the devices support such as smartphones, tablets and laptops that can be used to obtain information wherever and whenever they are (3–6). There are several types of online learning that can be done,

The 4th International Conference on Mathematics and Science Education (ICoMSE) 2020
AIP Conf. Proc. 2330, 050006-1–050006-8; https://doi.org/10.1063/5.0043118
Published by AIP Publishing. 978-0-7354-4074-6/$30.00

namely knowledge base, online support, asynchronous and synchronous training, hybrid training (7). It is hoped that through the support of learning tools and the selection of appropriate online learning techniques can support the effectiveness of learning.

Online learning has been implemented at the Universitas Papua, which utilizes e-learning using the Moodle platform. The e-learning was originally designed to complement face-to-face learning in the classroom. During the Covid-19 pandemic, learning was fully implemented online, one of which was through e-learning. The e-learning is equipped with various learning resources oriented to Higher Order Thinking Skills (HOTS). HOTS is an important thinking ability possessed by students in solving various problems encountered (8,9). Even though the learning implementation is online, students' HOTS still need to be developed.

The effectiveness of the use of e-learning, one of which is shown by the independence of students in learning or known as Self Directed Learning (SDL). SDL is someone's readiness or willingness to learn independently, which consists of components of attitudes, abilities and personal characteristics (10) and is responsible for their own learning outcomes (11). SDL can be used as a benchmark to measure the success of students in achieving learning outcomes in their learning environment, one of which is in e-learning (12). Therefore, the purpose of this study is to describe the quality of the SDL instruments used and analyze the students' SDL ability after applying learning through Moodle e-learning platform with HOTS-oriented.

RESEARCH METHODS

The research was a descriptive study that aimed to obtain an overview of students' SDL during the implementation of e-learning with HOTS-oriented. The study began with the preparation of the SDL instrument which was reviewed from 5 indicators as shown in Table 1 namely indicators of awareness, learning strategies, learning arrangements, learning targets, and the evaluation of processes and learning outcomes (13).

TABLE 1. The indicators and statements of SDL instrument.

Indicators	Items	Statements
Learning Awareness	+1	a. I can determine the conditions that support the learning process using e-learning
	+2	b. I know when to ask
	+3	c. I can try many ways to learn
	-4	d. I have not been able to identify the cause of my failure in learning
	+5	e. I can consider the time and place of study
	+6	f. I know what I want to learn
	+7	g. I cannot develop ideas
Learning Strategies	+8	a. I am looking for other supporting sources
	+9	b. I know the best way to learn
	-10	c. I have no special way of learning
	+11	d. I can discuss to get a better understanding of the material
	-12	e. I do not know the right learning method through e-learning
	+13	f. I can follow the learning method through e-learning
	-14	g. I copy a friend's task if there is an assignment given
Learning Settings	+15	a. I manage independent study time outside of scheduled online lectures
	+16	b. I can learn independently through e-learning
	-17	c. I cannot determine the extent of my understanding of the material
	-18	d. E-learning makes me lazy to learn
	+19	e. I can adjust the way of learning through e-learning
	+20	f. I am able to link the information that has been collected with the topic of study
Learning Targets	+21	a. I can target the score that will be achieved
	+22	b. I can solve the problem according to the plan
	+23	c. If there is something I have decided to learn, I can make time for it, no matter how busy I am
	+24	d. I can study according to the specified time target
	-25	e. I have difficulty in targeting the completion of the tasks assigned
The Evaluation of Process and Learning Outcomes	+26	a. I know what must be done to maximize learning
	-27	b. I did not double-check the assignment I completed
	+28	c. Online learning allows me to evaluate learning independently
	+29	d. I try to find mistakes in learning and plan for improvement
	-30	e. I do not check problem-solving with different methods to make sure the results are correct
	-31	f. I cannot do the assignment after studying the material
	+32	g. I can directly know the assignment assessment from the lecturer

The SDL questionnaire used a Likert scale with five choices: 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree). The SDL questionnaire was filled out by students in online through e-learning. There were 77 prospective teachers at the Universitas Papua who gave their responses to the SDL questionnaire.

The Rasch Model analysis technique was used to test the SDL instrument and at the same time assessing the student's SDL after the implementation of Moodle e-learning platform with HOTS-oriented. Rasch model is an analytical tool that can test the reliability and validity of research instruments; it can even test the suitability of people and items simultaneously (14). The software used for SDL testing was Winstep Program 4.4.0. The Rasch modeling technique was performed to assess the validity and reliability of the instruments used, rating scale, item validity, and to demonstrate the distribution of SDL wright items and persons. Analysis using Winstep application obtained test results based on application output tables. Based on the output table 3.1 summary statistics and table 23 item dimensionality, the instrument's validity and reliability are obtained. Rating scale analysis results are obtained based on the output table 3.2 rating (partial credit) scale. Each SDL item is valid from the output table of 13 measure items. SDL level analysis is obtained by distributing items and persons that can be obtained from output table 1 variable (wright) maps.

RESULTS AND DISCUSSION

This study began with an analysis of the quality of SDL instruments used before analyzing students' SDL abilities after the implementation of Moodle e-learning platform with HOTS-oriented. Instrument quality analysis consists of reliability and validity analysis. The analysis results of SDL instrument reliability are shown in Table 2.

TABLE 2. The analysis results of SDL instrument reliability.

	Logit Value (SD)	Separation	Reliability	Alpha Cronbach
Person	0.77 (0.57)	2.31	0.84	0.83
Item	0.00 (0.63)	4.22	0.95	

Table 2 showed that the average logit value was 0.77, with a standard deviation of 0.57 was in the ideal category (ideal value if greater than 0.50) (14). While the average of logit item value was 0.00 with a standard deviation of 0.63 or it was in the ideal category, which showed that the diversity of logit items was good. The separation of person value was 2.31, while the separation item value was 4.22. It showed that the personal aspect was less than ideal (ideal separation value above 3.00) (14); meanwhile, on the item aspect, it was obtained an ideal value. The less person separation value indicated that if the next test is performed, the data instability is obtained. Person reliability value was 0.84 or ideal category (ideal value if greater than 0.67) (14). This showed that the respondents in this study were quite diverse. The item reliability value was 0.95 or very good category. Cronbach alpha value was 0.83 or good category. The Cronbach alpha value showed that overall the person and item reliability were quite good. The SDL instrument validity test in this study also used the Rasch Model technique. The results of the validity analysis can be seen in Table 3.

TABLE 3. The analysis results of SDL instrument validity.

	Outfit Mean Square (MNSQ)	Outfit Z-Standard (ZSTD)	Raw-variance	Unexplained variance
Person	1.01	-0.20	30.5%	7.2%
Item	1.01	-0.10		

The Outfit Mean Square (MNSQ) value of person and item obtained an ideal value (received in the range of 0.5 <MNSQ <1.5) (15). Similarly, the Outfit Z-Standard (ZSTD) value both obtained ideal values (received in the range of -2.0 <ZSTD <+2.0) (16). The raw variance value in this study was 30.5% or in the less ideal category (ideal if it is greater than 20%), while the Unexplained variance value was 7.2% or in the ideal category (ideal if less than 15%) (16). Therefore, these results showed that the instrument used indicated a pretty ideal unidimensional.

The next test was diagnostic validity. This test aimed to determine whether the ranking scale used was understood (monotonic) or not. The analysis results of diagnostic validity can be clearly shown in Figure 1.

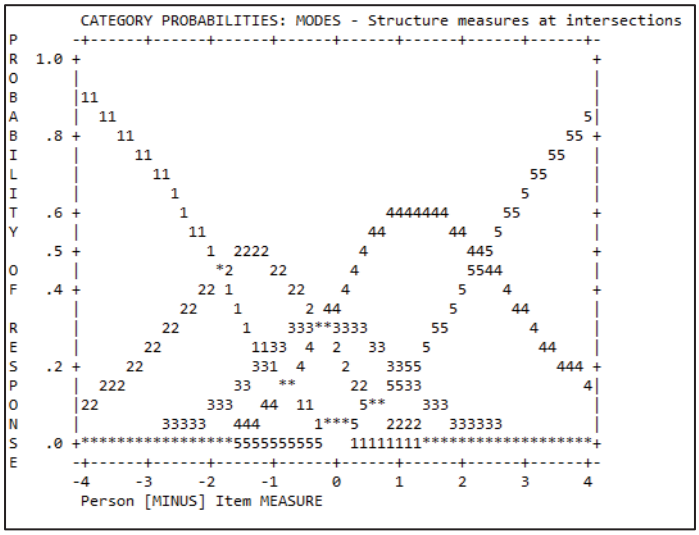


FIGURE 1. The analysis results of the ranking scale.

Figure 1 showed options 1 (strongly disagree), 2 (disagree), 4 (agree), and 5 (strongly agree) were in separated position or relatively understandable by the respondent. Whereas in option 3 (neutral), it was slightly covered or relatively difficult to be distinguished/chosen by respondents. But overall, it can be seen that the validity level of the ranking scale in this study was quite good. This valid result because of respondents can distinguish their preference level based on selection criteria.

The next test was the items validity test. The analysis of SDL instrument items validity was carried out to determine whether there were outlier items and items that were not accurate in measuring. Figure 2 shows the measurement results of the validity of the item.

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
14	354	77	-2.15	.22	1.96	4.6	1.87	4.1	A .20	.26	59.7	63.5	I14
7	174	77	1.79	.13	1.80	4.4	1.89	4.7	B-.33	.45	27.3	43.4	I7
27	284	77	-.02	.14	1.75	3.7	1.78	3.8	C .42	.39	37.7	50.9	I27
18	301	77	-.39	.15	1.61	2.9	1.55	2.7	D .52	.37	40.3	55.0	I18
31	301	76	-.48	.16	1.59	2.8	1.50	2.4	E .53	.36	43.4	56.2	I31
32	269	77	.27	.13	1.35	2.1	1.44	2.5	F .26	.41	41.6	44.0	I32
10	261	77	.41	.13	1.26	1.7	1.27	1.7	G .43	.42	28.6	40.4	I10
5	300	77	-.36	.15	1.25	1.4	1.27	1.4	H .29	.37	55.8	55.0	I5
12	251	77	.58	.13	1.24	1.6	1.25	1.6	I .51	.43	37.7	37.7	I12
6	298	77	-.32	.15	1.16	.9	1.14	.8	J .30	.37	57.1	54.9	I6
25	265	77	.34	.13	1.16	1.0	1.13	.8	K .51	.42	40.3	42.7	I25
28	296	77	-.27	.15	1.07	.5	1.08	.5	L .35	.37	57.1	54.4	I28
17	234	77	.85	.12	1.01	.1	1.00	.0	M .44	.44	36.4	37.0	I17
16	299	77	-.34	.15	.98	.0	.95	-.2	N .55	.37	55.8	54.9	I16
11	281	77	.04	.14	.98	-.1	.97	-.1	O .36	.40	49.4	49.6	I11
30	248	77	.62	.13	.94	-.4	.93	-.5	P .50	.43	44.2	37.5	I30
21	253	77	.54	.13	.87	-.9	.87	-.9	p .47	.43	45.5	38.7	I21
4	222	77	1.03	.12	.80	-1.5	.85	-1.1	o .31	.45	45.5	36.6	I4
8	306	77	-.51	.16	.79	-1.1	.82	-1.0	n .18	.36	71.4	56.5	I8
9	279	77	.08	.14	.81	-1.2	.80	-1.2	m .50	.40	45.5	47.5	I9
3	306	77	-.51	.16	.77	-1.3	.79	-1.2	l .33	.36	63.6	56.5	I3
1	290	76	-.22	.15	.75	-1.5	.79	-1.2	k .32	.38	64.5	54.0	I1
15	292	77	-.18	.15	.79	-1.3	.78	-1.3	j .29	.38	55.8	53.2	I15
23	284	77	-.02	.14	.77	-1.4	.77	-1.4	i .39	.39	59.7	50.9	I23
19	297	77	-.29	.15	.76	-1.4	.69	-1.9	h .53	.37	64.9	54.5	I19
13	288	77	-.10	.14	.67	-2.1	.68	-2.0	g .50	.39	57.1	52.0	I13
24	287	77	-.08	.14	.67	-2.2	.67	-2.1	f .46	.39	58.4	51.9	I24
2	285	77	-.04	.14	.66	-2.2	.64	-2.4	e .50	.39	66.2	51.3	I2
26	287	77	-.08	.14	.64	-2.4	.63	-2.4	d .54	.39	62.3	51.9	I26
20	288	77	-.10	.14	.62	-2.5	.58	-2.8	c .49	.39	64.9	52.0	I20
22	266	77	.32	.13	.59	-3.2	.54	-3.5	b .55	.42	51.9	42.8	I22
29	299	76	-.43	.16	.55	-2.9	.57	-2.8	a .44	.36	67.1	55.8	I29
MEAN	279.5	76.9	.00	.14	1.02	-.1	1.01	-.1			51.8	49.5	
S.D.	30.8	.3	.63	.02	.38	2.1	.38	2.1			11.6	7.0	

FIGURE 2. The measurement results of the items validity.

In Figure 2, it can be seen that the Standard Deviation (SD) of Item Measure was 0.63. This showed that items number 7 and 14 were outliers (Measure < 2SD and Measure > 2SD). S.E. (Standard Error) Model Value in Figure 2 showed that all items had a good level of accuracy (below 0.5). Therefore, the results of the reliability and validity analysis through Rasch model showed that the SDL instrument was appropriate to use. The value of logical items for outliners 7 and 14 can be considered to evaluate the evaluations of those items by respondents. The statement things are less reliable in the estimation of the respondent. However, the overall standard error shows that each SDL item will correctly measure respondents ' responses to use the SDL instrument properly.

The analysis of students' SDL analysis after the implementation of Moodle e-learning platform with HOTS-oriented, was carried out through univariate analysis. It was done in order to show the level of respondents' approval towards each SDL indicator seen from the distribution of Wright Items and Person (characteristics) generated from Rasch model. The results of the analysis showed two aspects, namely on the left showed the distribution of respondents while on the right showed the distribution of SDL questionnaire statement items as in Figure 3.

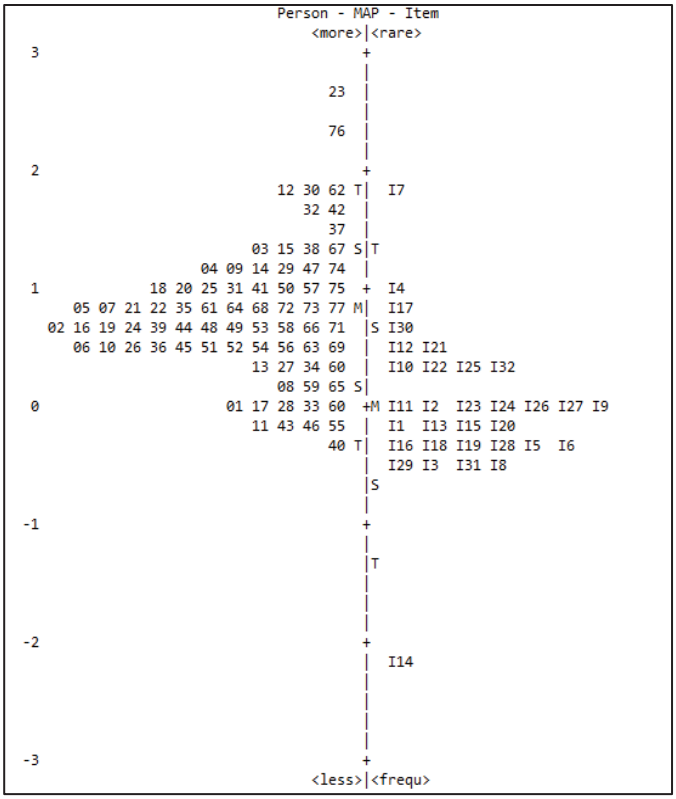


FIGURE 3. The distribution of SDL wright item and person.

Figure 3 showed that the average logic value (M) of respondents was higher than the logical value of the statement, which means that most of the responses agreed with the SDL ability obtained during learning. Most students answered, agree or strongly agree with the SDL statement items.

Indicator of Learning Awareness

In the indicator of learning awareness, there were seven statements about students determined the conditions that support the learning process using e-learning (+1). This statement had a logit value below 0.00 logit which indicated that the statement was easily approved by students. This showed that students could determine the right conditions in using e-learning as a learning tool. The next statement relating to indicators of learning awareness is that students know when to ask questions (+2), try many ways to learn (+3), consider the time and place of learning (+5), and know what they want to learn (+6). These statements were also easily agreed by students. Besides, there were some statements that are difficult to approve, such as the students' ability to identify the causes of failure in learning (-4) and the ability to develop ideas (+7). Students still have limitations in developing their ideas in learning through e-

learning. Lecturers need to optimize the use of appropriate evaluation instruments through e-learning so students can be motivated to develop their ideas in problem-solving.

Indicator of Learning Strategies

In the learning strategy indicator, there were seven statements namely students were looking for other supporting resources in learning (+8), knowing the best way to learn (+9), can discuss to better understand the material (+11), follow the learning method through e-learning (+13) and copy the friend's work if a task is given (-14). These statements were easily agreed by students. However, students were difficult to agree with some statements about students have no specific way of learning (-10), and students find it difficult to know the right learning method through e-learning (-12). One reason is that in e-learning, learning methods have been determined by the lecturer so students must follow each step of learning to achieve the expected goals. It is one of the challenges in implementing e-learning, namely the difficulty of controlling student learning. One solution that can be done is to create a virtual interaction between lecturers and students intensively both through chat facilities and video conference (17). By optimizing the use of e-learning is expected to foster student confidence in determining how they learn.

Indicator of Learning Settings

Statements related to the learning settings indicator dealing with students are able to manage independent study time outside of scheduled online lectures (+15), able to study independently through e-learning (+16), e-learning makes them lazy to learn (-18), adjust the way of learning through e-learning (+19), link the information gathered with the topic being studied (+20). Those statements were easily approved by students. Meanwhile, students were difficult to agree with the statements about the difficulty in determining the extent of understanding the material (-17). Most students fell that learning through e-learning was difficult for them to determine the extent of their understanding of the subject matter. This shows that lecturers need to prepare students to be able to learn according to the targets to be achieved. Learning readiness is the overall condition of a person who makes him ready to learn. SDL includes the readiness of students in learning (18). Students with high SDL have higher self-management abilities compared to students with moderate SDL (19). Students with high SDL are able to manage their time well, especially time to study, set strict time limits to get things done, orderly, systematically, and are responsible for the educational process.

Indicator of Learning Targets

An easily agreed statement relating to indicators of learning targets is about taking time to learn (+23) and learning according to the specified time target (+24). This shows that overall students can determine and target the right time in learning through e-learning. The use of e-learning gives freedom to them in learning whenever and wherever they are. Various materials and learning activities through e-learning also helped to develop students' SDL such as determining themselves when they have to answer connections questions, collecting assignments, and completing online quizzes. In addition, some statements that are difficult for students to agree with dealing with learning target indicators, namely about students being able to target scores that can be achieved (+21), solving problems according to planning (+22) and statements about targeting completion of assignments given (-25). This shows that students have not been able to target the score that can be achieved and still have difficulty in solving problems in accordance with planning. The strategy that can be done to overcome this is that the lecturer can convey what targets should be achieved by students in learning through e-learning (18). Submission of learning targets can be displayed in the initial description of learning so students can determine the extent to which they must master the subject matter.

Indicator of the Evaluation of Process and Learning Outcomes

Statements that have a good level of acceptance in the indicator of evaluation of process and learning outcomes namely about students know what needs to be done to maximize learning (+26), reviewing completed task (-27), evaluating learning independently (+28), find errors in learning and plan for improvements (+29), and do assignments after studying the material (-31). Statements that are relatively difficult for students to agree with is about students check problem solving with different methods to ensure the results are correct (-30) and directly know the assignment assessment by the lecturer (+32). One reason that makes the statement is difficult to approve because there is an assessment given by the lecturer, especially related to the project assignment, which is given after the assignment

period ends. Students can find out the results of their assignments after the lecturer checks their assignments. Unless they are given a quiz in the form of online multiple choice questions, they can directly know the results of the task.

Overall, students have relatively good SDL skills towards learning through e-learning. Various facilities on the Moodle e-learning platform allow SDL indicators to develop such as discussion forums, notifications, variations of learning material (text, images, videos, animations, simulations, multimedia, or virtual laboratories) as well as online quiz features (20). The discussion facility allows students to do open discussion topics and reply to each other comments related to the issues discussed, the notification facility makes it easy for students to check the availability of learning materials, quizzes, and assignments given by lecturers. So with these features, students can take the initiative to carry out learning activities independently or good SDL skills through e-learning (21). SDL remains an important component in the e-learning process, especially in maintaining student performance until the end of the learning process (22,23). Students who have good SDL skills are expected to be more flexible in following the learning process with e-learning.

CONCLUSION

The analysis results of the students' SDL after applying Moodle e-learning platform with HOTS-oriented showed a good level of agreement. This shows that students can develop their SDL abilities in learning. However, some items of statements still have a low acceptance rate that is generally related to the students' ability to measure the level of failure in learning. These results become a reference for lecturers to continue improving the optimization of the use of e-learning, one of which is through the consideration of presenting the right type of evaluation instrument. So that students, especially prospective teachers, have the ability to measure their achievement in learning.

ACKNOWLEDGMENTS

We would like to thank the Ministry of Research and Higher Education for the financial support through Inter Higher Education Institution Cooperation scheme with the contract number: 198/SP2H/AMD/LT/DRPM/2020.

REFERENCES

1. Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, et al. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. Lancet Child Adolesc Heal [Internet]. 2020;4(5):397–404. Available from: http://dx.doi.org/10.1016/S2352-4642(20)30095-X
2. Lestari PAS, Gunawan. The Impact of Covid-19 Pandemic on Learning Implementation of Primary and Secondary School Levels. Indones J Elem Child Educ. 2020;1(2):24–30.
3. H. Iksan Z, Mohd Saufian S. Mobile Learning: Innovation In Teaching and Learning using Telegram. IJPTE Int J Pedagog Teach Educ. 2017 Mar 16;1(1).
4. Brun M, Hinostroza JE. Learning to become a teacher in the 21st century: ICT integration in Initial Teacher Education in Chile. J Educ Technol Soc. 2014;17(3):222–38.
5. Damopolii I, Kurniadi B. The Development of Android-based Mobile Learning Supported by Problem-based Learning Strategy for Students' Learning Success. Int J Sci Technol Res. 2019;8(7):190–3.
6. Yusuf I, Widyaningsih SW, Sebayang SRB. Implementation of E-learning based-STEM on Quantum Physics Subject to Student HOTS Ability. Turkish Sci Educ. 2018;15(December):67–75.
7. Basilaia G, Kvavadze D. Transition to Online Education in Schools during a SARS-CoV-2 Coronavirus (COVID-19) Pandemic in Georgia. Pedagog Res. 2020;5(4):1–9.
8. Yusuf I, Widyaningsih SW, Prasetyo ZK, Istiyono E. Higher order thinking skills (HOTS)-oriented e-module in electric circuit. J Phys Conf Ser. 2020;1521(2):1–7.
9. Istiyono E. IT-based HOTS assessment on physics st learning as the 21 century demand at senior high schools: Expectation and reality IT-Based HOTS Assessment on Physics Learning as the 21 st Century Demand at Senior High Schools : Expectation and Reality. AIP Conf Proc. 2018;2014(020014):1–6.
10. Loyens SMM, Magda J, Rikers RMJP. Self-directed learning in problem-based learning and its relationships with self-regulated learning. Educ Psychol Rev. 2008;20(4):411–27.
11. Bhandari B, Chopra D, Singh K. Self-directed learning: assessment of students' abilities and their perspective. Adv Physiol Educ. 2020;44(3):383–6.
12. Heerden D van, Goosen L. Assessments used in an open distance e-learning environment to promote self-

directed learning. In: Proceedings of the European Conference on e-Learning, ECEL. 2019. p. 593–602.
13. Saxon DP. Student responsibility and self-directed learning: an interview with Christine McPhail. J Dev Educ [Internet]. 2013;36(3):14–7. Available from: https://eric.ed.gov/?id=EJ1067270
14. Boone WJ, Staver JR, Yale MS. Rasch Analysis in the Human Sciences. New York London: Springer Dordrecht Heidelberg; 2014.
15. Adams RJ, Khoo S-T. Quest : the interactive test analysis system. Camberwell, Vic.: Australian Council for Educational Research; 1996.
16. Bond T, Yan Z, Heene M. Applying the Rasch model: Fundamental measurement in the human sciences. New York: Routledge; 2020.
17. Yusuf I, Widyaningsih SW. Implementing E-Learning-Based Virtual Laboratory Media to Student' Metacognitive Skills. Int J Emerg Technol Learn. 2020;15(5):63–74.
18. Subekti S, Patriasih R, Ana A, Maosul A. Self-directed learning analysis: A response of students using e-learning (SPOT-UPI). J Phys Conf Ser. 2019;1402(077063):1–8.
19. Lee EY, Jeon YJJ. The difference of user satisfaction and net benefit of a mobile learning management system according to self-directed learning: An investigation of cyber university students in hospitality. Sustain. 2020;12(7):1–13.
20. Angriani P, Nurcahyo H. The influence of moodle-based e-learning on self-directed learning of senior high school students. AIP Conf Proc. 2019;2120(July):060007–1–060007–6.
21. Yong S, Kim Y, Moon I. E-Learning Content Search Support System Design for Self-Directed Learning. J Pract Eng Educ. 2020;12(April):73–83.
22. Smith PJ. Learning preferences and readiness for online learning. Educ Psychol [Internet]. 2005 Feb 1;25(1):3–12. Available from: https://doi.org/10.1080/0144341042000294868
23. Hung M-L, Chou C, Chen C-H, Own Z-Y. Learner readiness for online learning: Scale development and student perceptions. Comput Educ [Internet]. 2010;55(3):1080–90.

Ministry of Education and Culture
UNIVERSITAS NEGERI MALANG (UM)
Faculty of Mathematics and Natural Sciences
Jl. Semarang 5, Malang 65145 Phone./Fax. (0341) 562180 Website http://fmipa.um.ac.id/

CERTIFICATE

No.: 26.8.1/UN32.3/SR/2020

This is to certify

Irfan Yusuf

As the

Presenter

of a paper entitled The Analysis of Self Directed Learning (SDL) through Rasch Modeling: Case Study on Prospective Teachers during the Use of ELearning with HOTS-oriented in the Period of Covid-19 Pandemic

In the **4th International Conference on Mathematics and Science Education**
"Innovative Research in Science and Mathematics Education in the Disruptive Era"
organized by the Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang
August 25th-26th, 2020, Malang, Indonesia

Dean of Faculty of Mathematics
and Natural Sciences,

Prof. Dr. Hadi Suwono, M.Si
NIP. 196705151991031007

Malang, August 26th, 2020
Chairman,

Habiddin, S.Pd, M.Pd, Ph.D
NIP. 197912132008011012