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[IJERE] Submission Acknowledgement

Dr. Lina Handayani <linafkm@gmail.com> Tue, Jun 1, 2021 at 11:01 PM
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The Impact of Online Learning-BasedLearning Based Google Classroom on Increasing Students' Information Literacy Ability

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Commented [AB1]: This can be further simplified as "The Impact of Google Classroom on Increasing Students' Information Literacy".

Google classroom is obviously online based. This is redundant, thus the recommendation to delete it. Thank you.

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ABSTRACT

Information lIliteracy at the higher education level is very important. bBecause at the university level, information literacyit tends to be problematic in fostering students' critical thinking skills. in includingthe awareness, of collection of information, understanding synthesis,, analysis, synthesis description, understanding of the reasoning forand the use of information and their attitudes to the treatment of information at the university level. This study examined the effects of the online learning Google classroom of Google onin enhancing the information literacy amongof students. This study has a quantitative research design that involves the evaluation of a single group of individuals before and after experimentsobserved a one-group pretest-posttest experimental design. This research has been carried out withinvolved 65 students from the study program othe cf chemistry course in under the biochemistry program. In the class, there were 6 students, the population being the same as the survey. Data from Google forms and questionnaire items have been collected for this study. The instrument used to assess students' awareness information literacy was aconsist of fair multiple-choice questionfair set of multiple-choice questions. The test results for validation werewas found to be very valid at 4,22% for a very valid category and highly reliableility was at an alpha level of 0,86 for very high categories. The findings of researchthis research thatshow that the information literacy of students capacity improved before and after their learning exposure using Google classroom based on the descriptive and inferential statistics. Moreover, because the students' attitude towards the online platform shows that they are more willingness of students to learn using online learning based on Google classroom in the classroom was higher than the non-online or (conventional) learning platformsso that student perceptions were included in the positive category. Therefore, it canIt can therefore be inferred that introducing Google classrooms focused onin online learning can effectively boost students' information literacy ability.

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1. INTRODUCTION

In the twenty-first century, digital technologies and communication instruments are emerging in school education. Students must have the ability to access, compile, and gather useful knowledge from various digital sources for this learning pattern, determine the adequacy and reliability of data collected, and evaluate

whether selected information can be processed[1],[2]. So, in the 21st-century~~21st-century~~ students need information literacy to make learning progress effective.

Info-Literacy (IL) refers to know-how and effective methods of information management to understand the logic behind information gathering, synthesizing, analyzing, interpreting, and assessing the relevant information[3],[4],[5]. IL addresses capability in four main points of view[1],[2]: A cognitive view on knowledge literacy for educating and solving problems; a meta-cognitive view of information processing capabilities; an important perspective on study appreciation and enjoyment; a socio-cultural perspective on the ability to display autonomy and social responses. The study of information literacy during this period has gained ~~an~~ increasing interest, especially in University education. [6] Stresses that knowledge literacy enhances the abilities of students to think critically. Meanwhile, [7] Information literacy showed to be linked to student motivation and confidence in knowledge searching the internet~~Internet~~. However,[8] stress how the higher education curriculum adds critical knowledge literacy. [9] stated that at university level the concept of Literacy of knowledge remains problematic. It is less well known the importance of information literacy.

Schools and education systems~~systems of education~~ must integrate technologically rich learning platforms and tools to~~in order to~~ understand the potential benefits of the changing emerging technologies and the interactive learning climate[10]. ICT entry was regarded as positive regarding students' self-reported digital skills[11]. In contrast, Zhong found a negative link between the rate of ICT integration in different countries and the digital skills of young people. This result shows that an increase in the rate of ICT penetration without schools, in particular digital skills, does not enable young people to learn ICT in education. In addition, as technology~~technologie~~ is continuously evolving and complex, students need to continually develop their knowledge and skills [12]. In reality, high-performance workplaces use modern technology to increase productivity quickly. This development has contributed to fundamental changes in literature and the quality of organizational effectiveness[13],[14]

Today, higher learners are rapidly embedded in digital technology, allowing them to use these technologies and develop new technologies, scientists, and web designers. A lot of students want new technologies and benefit from them[15]. However, new technology continues to change students' lives[16]. This makes an online forum a way to save time, develop networking skills and educate people and enable people to keep up-to-date [12]. [17] Declared that Millenniums could not respond to modern technologies in the classroom. The implementation process~~process of implementation~~ thus affects their behavior target and the achievement of the learning process directly[18]. LMS is one of the most troubling higher education devices[19]. For example, Moodle, Blackboard, Edmodo, Sakai, and Google Classroom are LMS. Google classroom recently increased its prominence, value, and the most rapidly adopted form of university education[20]. It is ~~an~~ internet-free~~internet free~~ software that can be used to create and manage online courses for people with a Google account.

Newly recognized, innovative, and one of Google Classroom's best online learning tools. The education group accepted a proposal from Google Classroom for the e-learning method. Technology is incorporated into classrooms. The widespread use of this revolutionary technology generated literature data. Teachers can support face-to-face learning through Google Classroom[21]. Google Classroom provides fresh and varied challenges in continuing education to teachers and students. First, everybody worldwide has a package called Google education apps tools and applications. All include~~includes~~ Gmail, drive, and paper[22]. Second, Google Classroom usability is renowned[23] and its easy organization of work and time saving, Fast access From tablets, PCs, and cellular devices. According to estimates~~, in the first six months,~~ Google Classroom got almost 30 million teaching and students' jobs in the first six months. The educational group, therefore, recommends Google Classroom strongly[22]. Finally, we offer the flexibility of Google Classroom in the programming process online~~in an online way~~, minimize travel costs and meet all the users. Google Classroom, a Google education program, will provide online education[24]. Google classrooms are highly recommended as they can be used anywhere and anytime~~when~~ via a smartphone. The students don't know about smartphones. Most of them already have Google teachings~~,~~ to do~~so that~~ effective and creative learning ~~can be done~~[25].

Further study was also suggested to explore how these systems affect student training and equate user patterns with the actual goal of the system such that they are successful students. In using these technologies, the method must be evaluated in a given situation to~~so as to~~ genuinely and under no circumstances determine its effectiveness[26]. The main assumption is that technical advantages of hypocritical higher education~~hypocritical higher education technical advantages~~ cannot enhance learning by~~through~~ applying technology to traditional training[27]. Studies[28],[17] ~~they~~ also noted that even with a boom in educational technology capital, ~~issues of~~ inadequate engagement and adaptation persist in the classroom. Students' initial acceptability and sensory inclinations to incorporate these emerging technologies into educational processes

are partially the results~~result~~. Consequently, students' use of such facilities is still limited, and it is important to resolve the reasons behind these habits. According to[20], Further research into user engagement and comfort is needed while identifying methods for enhancing learning. Furthermore, if these instruments do not take responsibility, any technology used in the classes will not work, and revenues will drop well [29]. The location of Google Classroom mobile teaching. [30] Recorded the acceptance and conduct of classes by Google in universities since the usage of literature by Google Classroom is reduced worldwide.

To find solutions to existing problems based on the concept above, an invention is necessary. Researchers used learning tools through online learning models at Google classrooms to solve those problems. This model also allows students to carry out experiments / study. Teachers must be careful not to supply the contents, since teachers will deliver them electronically via the Google classroom outside the classroom. During face-to-face class, the teacher will provide the details and interactions. The instructor will focus on student comprehension checks. Different fundamental natural laws may characterize chemical processes~~Chemical processes may be characterized by different fundamental natural laws~~. In that way, however, theoretical abstraction and rationale must be formulated and processed. Mathematical models often need quantitative formulas[30]. It is necessary to represent mathematically because students can easily solve abstract chemical issues[31]. Students also face a problem in chemistry with the aid of mathematical equations, which needs quantitatively to be solved to~~so that students can~~ learn the skill of representing chemistry.

The goal of this research is to increase student information literacy ability by Google Classroom online learning. The problem of research is 1) How is the impact of learning through the OLBGC model on increasing student information literacy ability?, 2) How is student perception of the OLBGC model is implemented?.

2. RESEARCH METHOD ~~(10 PT)~~

Design of Research

The quantitative analysis design of this study includes the pre- and post-measuring of ~~various groups of people~~the learning outcomes of the respondents. The ~~types of pre-~~experimental design of this study was a one group pre-test-posttest design ~~in this study~~[32]. The research ~~-~~design ~~shape~~ of this study is shown in Table 1

Table 1. Design of Research

Subject	Pretest~~Pretest~~	Posttest
One Group	O_1	O_2

where~~With~~:

O_1 = p~~P~~retest value before OLBGC model learning.

O_2 = p~~P~~osttest value after OLBGC model learning.

Teachers use Classroom Google for posting questions, connections, power points, photos, documents, games, guides, and tests. Students work on Google Classroom computers everyday, such as daily question, power points, Images, quests online, Google Docs, sports, etc.

Participant(s)

The students studying chemistry in biochemistry carried out this research. A total of 65 students participated in the class with the same population as the study. The courses included 2-hour theory and 1-hour weekly courses. The tutorial includes teaching activities, lectures, and practical presentations. This is a precondition for LMS institutions, especially for online learning. Therefore, over the last six months or in another area both students have experience with LMS. However, the platform now provides little engagement and an exciting learning experience for many students, in particular. To that end, students who downloaded the Google Classroom application at~~in~~ the beginning of the semester were sponsored by the teacher. Registration for Google classroom is compulsory. Teaching materials were available for students via slides and mobile (pdf) or YouTube videos before their lesson. Reading content was downloaded from your mobile devices and read offline. The theory course conducted in a classroom with several students in order to improve their interaction with them was decisive in the advancement of the SRS into the Google Classroom. The SRS allowed trainers to post questions and discuss issues on the stream tab during the lecture (Fig. 1).

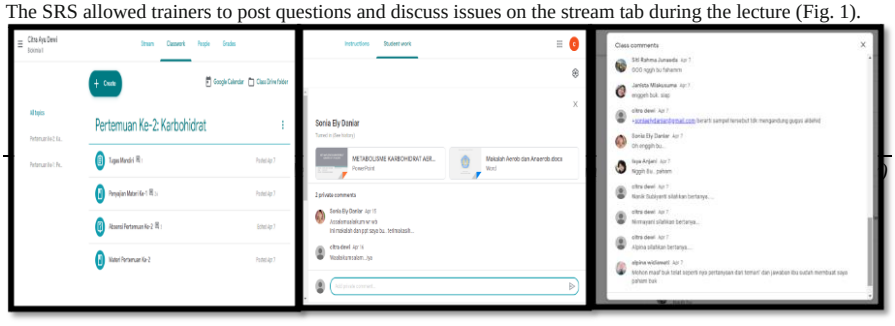

Figure 1. Google Classroom App screenshot for the student

Also relevant were submitting, handling, analyzing, and collecting feedback. An~~A~~ easy way to synchronize publications, correspondence, and note was another benefit of using the Google class. These data are available through intelligent devices, and therefore Information must be disseminated promptly.

Instruments of Research

For this study, data in Google format and questionnaire items were collected. Items are based on the evaluation model LMS, which tests~~test~~ students' commitment~~the commitment of students~~ to content, communication, and the delivery of tasks. Google students are questioned at the end of the semester. The test used to investigate the ability to read information was a fair query with many options. The questionnaire for student interpretation in Google classroom focused on online learning consists of 18 statements. The tool is translated into Indonesian and reviewed by three Indonesian lecturers for the accuracy of the queries. A pilot test was then conducted to assess the questionnaire's reliability and validity. The distribution of information on questionnaire literacy ability is provided in Table 2.

Table 2. Aspect of Information Literacy

Component of Information Literacy	Indicator of Information Literacy	Item
Intermediate	• Define the relevant details • Select the most suitable information for the necessary information • Interpret the visual data (i.e. graphs, tables, diagrams) • Submit a research report • Preparation of bibliography • Build bibliographic records for various content types (i.e. books, articles, thesis, web pages) • Create quotes and use quotes in the document • Learn from success in problem solving	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Basic	• Using various types of printed sources (i.e. books, periodicals, encyclopedias, chronologies, etc.) • Using electronic sources of information • Locate in the library information sources • Using the list of libraries • Using the library catalog to locate tools in the library	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
Advanced	• Synthesize information newly obtained with previous information • Determine the material and the sections of a presentation (i.e. introduction, conclusion) (written, oral) • Create and arrange bibliographic records • Critique of the efficiency of the quest process and its items	21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Validity of the Information Literacy Instrument

An expert validates the information literacy instrument prior to implementation. The method has been validated with five Likert objects included, namely: 5= very valid, 4= valid, 3 = quite valid, 2 = less valid, 1 = invalid. As shown in Table3, the score obtained from validators is converted into five-dimensional~~five dimensional~~ qualitative data[33].

Table 3. Criteria for the validity of the information literacy instrument

Validity Interval (Va)	Criteria
Va> 4,21	Very valid

3,40 <Va< 4,21	Valid
2,60 <Va< 3,40	Quite valid
1,79 <Va< 2,60	Less valid
Va< 1,79	Invalid

Analysis of Data

The findings of the analysis were analyzsed with the SPSS 23. The questionnaire comprises two variables: information literacy ability and students perception of OLBGC model. The survey will bewas administered one day to students. Each student is requested to respond by a 5-point Likert scale, whereby '5' is 'strongly agreed,' 4 points is 'accord,' 3 points are 'agreement,' 2 points are a 'agreement,' one point is a 'strong disagreement. The questionnaire is distributed in August-September 2020 using the Google Form Framework. Increases in student information literacy were calculated based on the standardized T-test and Hake score gain in this study.

Commented [AB2]: Kindly check. Are they really the same? Thank you.

$$\%g = \frac{\%Sf - \%Si}{100 - \%Si} \times 100\%$$

With:

g = normalized gain
Sf = posttest score
Si = pretest score

Calculation results <g> are then seen in three classes of hake[34], namely:

Table 4. Gain Classification

Average Gain	Criteria
0,00 <g ≤ 0,30	Low
0,30 <g ≤ 0,70	Medium
0,70 <g ≤ 1,00	High

3. RESULTS AND DISCUSSIONS

In this study, the instrument used to measure students' information literacy ability was tested for expert validity and through SPSS 23 analysis. The results obtained from the expert test were 4.22% which indicated that the overall information literacy instrument was in the valid category. TheBased on the test results using SPSS 23 show that of all the 30 item items as a whole inare considered valid. criteria. As shown in Table 5.

Commented [AB3]: Where can we find this value in the table below? If this is the summarized or overall mean, then its should be presented there. Thank you.

Table 5. The Instrument Validity From Information Literacy

Items	Pearson Correlation	Sig. (2-tailed)	Category
1	.655**	.001	Valid
2	.865**	.001	Valid
3	.483**	.002	Valid
4	.565**	.000	Valid
5	.551**	.002	Valid
6	.566**	.001	Valid
7	.566**	.003	Valid
8	.555**	.004	Valid
9	.541**	.002	Valid
10	.554**	.001	Valid
11	.583**	.000	Valid
12	.627**	.001	Valid
13	.682**	.001	Valid
14	.746**	.001	Valid

15	.552**	.003	Valid
16	.876**	.001	Valid
17	.516**	.002	Valid
18	.656**	.001	Valid
19	.544**	.002	Valid
20	.521**	.002	Valid
21	.530**	.002	Valid
22	.590**	.000	Valid
23	.729**	.001	Valid
24	.541**	.002	Valid
25	.544**	.001	Valid
26	.646**	.001	Valid
27	.526**	.002	Valid
28	.647**	.003	Valid
29	.876**	.001	Valid
30	.555**	.000	Valid

The instrument used to measure information literacy ability was also analyzed using ~~the~~ SPSS 23 (Cronbach's~~th~~ ~~Alpa~~Alpha) to determine the reliability of the instrument. The~~Based on the analysis~~ results~~, it~~ showed that the reliability ~~value for 30~~coefficient of the items is 0.86, as shown in Table 6 with very high criteria.

Table 6. The ~~Instrument~~ Reliability Coefficient ~~from~~ of Information Literacy Coefficient

Cronbach's Alpha	N of Items
0.86	30

3.1. The Implementation of OLBGC Model Learning

Google's online learning process involves preliminary work, core tasks, and closing activities. The initial action was intended for students using an online learning media program in the Google classroom. Students need to learn and talk through the Google classroom application in key activities. In contrast, the lecturer can supply a virtual laboratory for biochemistry practice in the Google Classroom App. Students participate in the observation and study process individually. Students may also share their views at the closing events, complete the studied material, and conduct tasks at the end of each meeting. The following is the report on the introduction of Google's online learning, presented in Figure 2.

Figure 2. The introduction of Google classroom online learning

Early learning stages were still confused with using online information through Google Classroom~~,~~ since the learning paradigm for students at MATARAM UNDIKMA FSTT was new, and the Covid-19 pandemic that demanded distance and wide social levels did not enable lectures to be held on face to face~~a face to face~~

basis (online learning). Researchers addressed online teaching through Google classrooms in this study. The Google Classroom method for the introduction of online learning requires time to start training. The teacher requests students to provide their information and email address via Google Classroom for the online learning process. This is to encourage teachers to register Google classes to~~so they can~~ train students to interact directly with teachers and peers. The description of the biochemistry material taught includes:

- Structure, properties, and chemical reactions of hydrocarbons
- Aerobic and anaerobic metabolism.
- Citric acid cycle.
- Respiration and energy chains (ATP).
- Disorders of carbohydrate metabolism
- Oxidation and energy structures in LIPID
- Metabolism of ketone compounds
- LIPID biosynthesis.
- Structure, properties, and reactions of vitamins & minerals
- Genetic knowledge bias and flow in living systems.

3.2. The impact of the OLBGC model on increasing student information literacy ability

The data collected on students' information literacy before and after their online learning ~~online from~~using Google Classroom ~~on student's information literacy shows the effects of calculations with SPSS 23. The average results of preliminary and post-test students~~ are shown in Table 7.

Table 7. ~~Means and Standard Deviations~~Descriptive Statistics of ~~From~~ Students' Pretest and Posttest Information Literacy Abilities~~y~~

Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest~~Pretest~~	65	73	5.60	.989
~~Postest~~Posttest	65	77	5.36	.947

Table 7~~6~~ showed that mean X = 77 in online learning and Mean X = 73 in learning without online. This means that the average student's information literacy ability is greater in online learning than in online learning so that the difference between the arithmetic mean is significant at α Meaning-degree, the accompanying T-test analysis was carried out, and Table 8 shows the results of the analysis.

Table 8. Results of the T-test Analysis on Information Literacy Ability

		Levene's Test for Equality of Variances		T-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Informtion Literacy	Equal variances assumed	.971	.328	3.2	62	.002	4.34	1.37	1.60	7.08
	Equal variances not assumed			3.2	61.8	.002	4.34	1.37	1.60	7.09

The ~~meaning~~ p-value~~level~~ equal to ~~(~~0.002~~)~~ <0.05 can be seen in table 7, which shows a substantial statistical difference in~~of~~ students' information ~~knowledge~~ literacy before and after learning via Google online. The N-Gain test was performed to assess the increase in student knowledge literacy prior to and after Google Classroom usage and the results ~~of the~~are presented ~~study~~ in Table 9.

Table 9. Recapitulation Results from N-Gain

No.	Group	N	Ideal score	Value		N-Gain
				Minimum value	Maximum value	
1.	Pretest~~Pretest~~	60	100	50	60	0.33
2.	Posttest	60	100	60	80	

Commented [AB4]: Kindly clarify what you mean here. Thank you.

Commented [AB5]: Please be consistent. Is it 65 or 60? Thank you.

The student information literacy are improved based on the results shown in table 8. The observed pretest~~pre-test~~ and post-test levels of N-Gain were in the range of 0.33 with the average category. It has been found in this study that online learning based on Google Classroom is effective in improving students' information literacy ability. This is evidenced by the results of student information literacy online through Google Classroom, which is 77 while non online (conventional) is 73. The reason for online learning based on Google classroom is effective in improving students' information literacy skills because it can be done in several ways, namely 1) training intermediate information skills students in obtaining the needed information sources, 2) training students 'basic information skills in using information sources, and 3) training students' advanced abilities in determining valid information sources. The findings obtained are consistent with research carried out by[35], in which the use of technologies like e-text and e-library has made students feel better as they can~~are able to~~ offer successful, innovative, and updated submissions. Another research carried out by[36] founded that students who make comprehensive and intensive use of technology appear to adapt learning strategies rapidly with different technical resources to help the learning process. [37] research showed that literacy of knowledge has a positive influence on academic performance. Information literacy can lead to productive activities through software and computer programs, including word processing and worksheets~~, through software and computer programs~~[38]. [39] describe the results of research on the use of information literacy in different schools, which emphasizes various~~a variety of~~ important points, including giving students room to choose topics, encouraging flexibility in the learning process, and growing communication capabilities among students by using modern technologies.

3.3. Student perception of the OLBGC model is implemented

Student learning expectations identify student views on the learning model used during the training phase. Table 10 presents the findings of a student perception study on online learning using Google Classroom.

Table 10. Online Learning Perceptions Students Use Google Classroom

No	Indicator	Statement (%)					Category
		Strongly Agree	Agree	Doubtless	Disagree	Strongly disagree	
1	Want to read	4,2%	46%	29%	12,5%	8,3%	Positive
2	Lecture content easy to understand	4,2%	50%	25%	12,5%	6,25%	Positive
3	Encouraged to learn	4,2%	62,5%	25%	4,2%	0%	Positive
4	Reason for solving the problem	4,2%	68,75%	25%	0%	0%	Positive
5	Recognized and sharing your view	4,2%	75%	4,2%	12,5%	0%	Positive
6	Learn to be autonomous	12,5%	37,5%	31,25%	18,75%	0%	Positive
7	Acknowledgement of others	0%	80%	16,67%	12,5%	0%	Positive
	Average						Positive

Commented [AB6]: It would be better to present the overall mean so that the readers can understand better the overall perception of students in the use of Google Classroom. Thank you.

The data in Table 9 showed that overall experiences of students from Google online are positive. This is seen in the declaration indicators, specifically: Want to read were 46% answered agree; Lecture content easy to understand were 50% answered agree; Encouraged to learn were 62.5% answered agree; Reason for solving the problem were 68.75% answered agree; Recognized and sharing your view were 75% answered agree; Learn to be autonomous were 37.5% answered agree; and Acknowledgement of others from 80% to agree. The results showed that students in Google Online Learning have a positive view because the student experience in online learning is better than without online learning. [40] stated that online learning is an internet network online learning technique. As online learning makes listening to the learning process easier by using Android phones, tablets, or computers rather than only listening to the books an enjoyable learning technique for the students [41]. Students may also become less bored, interested, and involved in education by student learning with online learning[42]. Effective and enjoyable learning is based on students to actively engage in the learning process[43]. [44],[45] Online learning may enhance readability, build constructive perspectives, promote class discussions and improve the ability to read and think critically.

4. CONCLUSION

It can be concluded that the Google Classroom Online learning platform (OLBGC) greatly influences students 'information literacy capabilities and Google online learning students' expectations in a positive category. This showed that the OLBGC Model is much more effective than traditional learning. This study impacts~~has an impact on~~ how an efficient learning process can be implemented using Google Classroom, and policymakers can consider this for potential applications of the learning methods that Google Classes will introduce online. Suggestions for ~~the next~~future researchers to conduct similar research to display~~displaying~~ the OLBGC model's learning effectiveness, especially in assessing information literacy~~literacy of information~~ from other learning areas such as ~~various~~ in digital literacy.

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[IJERE] Editor Decision

Dr. Lina Handayani <ijere@iaesjournal.com> Fri, Sep 3, 2021 at 10:25 PM
Reply-To: "Dr. Lina Handayani" <linafkm@gmail.com>
To: CAD Citra Ayu Dewi <ayudewi_citra@ikipmataram.ac.id>
Cc: Muhali Muhali <Muhali@ikipmataram.ac.id>, Yeti Kurniasih <yetikurniasih@ikipmataram.ac.id>, Diah Lukitasari <diahlukitasari@ikipmataram.ac.id>, Abdul Sakban <sakban.elfath@yahoo.co.id>

The following message is being delivered on behalf of International Journal of Evaluation and Research in Education (IJERE).

Dear Prof/Dr/Mr/Mrs: CAD Citra Ayu Dewi,

We have reached a decision regarding your submission entitled "The Impact of Online Learning Based Google Classroom on Increasing Students' Information Literacy Ability" to International Journal of Evaluation and Research in Education (IJERE), a SCOPUS and ERIC indexed journal (https://bit.ly/2EI8hDj).

Our decision is to ACCEPT with revisions
Please prepare your revised paper (in MS Word or LATEX file format) adheres every detail of the guide of authors (http://tiny.cc/iaesijere, or http://tiny.cc/ijerelatex for LATEX file format), and check it for spelling/grammatical mistakes.

The goal of your revised paper is to describe novel technical results.

A high quality paper MUST has:
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(2) the proposed solution(s)/method(s)/approach(es)/framework(s)/ ....
(3) results achieved. It describes clearly what has been done before on the problem, and what is new.

Please submit your revised paper within 6 weeks.

I look forward for hearing from you

Thank you

Best Regards,
Dr. Lina Handayani
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=========
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For ORIGINAL/RESEARCH PAPER: the paper should be presented with IMRaD model:
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2. Research Method
3. Results and Discussion
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Congratulations on this very relevant study. However, I included some recommendations and corrections to make the presentation more concise and accurate. Kindly consider to improve the quality of your study. Thank you very much.

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The impact of Google Classroom to increase students' information literacy

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ABSTRACT

Information literacy at the higher education level is very important because it tends to be problematic in fostering students' critical thinking skills, including awareness, collection, understanding, analysis, synthesis, and the use of information and their attitudes to the treatment of information at the university level. This study examined the effects of the online learning Google Classroom in enhancing information literacy among students. This study observed a one-group pretest-posttest experimental design. This research involved 65 students from the Chemistry Course under the Biochemistry Program. The instrument used to assess students' information literacy consist of fair set of multiple-choice questions. The test was found to be very valid at 4.22% and highly reliable at an alpha level of 0.86. The findings of this research showed that the information literacy of students improved before and after their learning exposure using Google Classroom based on the descriptive and inferential statistics. Moreover, the students' attitude towards the online platform shows that they are more willing to learn using Google Classroom than the non-online or conventional learning platforms. Therefore, applying Google Classroom in online learning is effectively boost students' information literacy.

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1. INTRODUCTION

In the 21st century, digital technologies and communication instruments are emerging in school education. Students must have the ability to access, compile, and gather useful knowledge from various digital sources for this learning pattern, determine the adequacy and reliability of data collected, and evaluate whether selected information can be processed [1], [2]. So, in the 21st-century, students need information literacy to make learning progress effective.

Info-literacy (IL) refers to know-how and effective methods of information management to understand the logic behind information gathering, synthesizing, analyzing, interpreting, and assessing the relevant information [3]–[5]. IL addresses capability in four main points of view [1], [2]: i) A cognitive view on knowledge literacy for educating and solving problems; ii) A meta-cognitive view of information processing capabilities; iii) An important perspective on study appreciation and enjoyment; iv) A socio-cultural perspective on the ability to display autonomy and social responses. The study of information literacy during this period has gained increasing interest, especially in university education. White [6] stressed that knowledge literacy enhances the abilities of students to think critically. Meanwhile, information

literacy showed to be linked to student motivation and confidence in knowledge searching the internet [7]. However, Meulemeester *et al.* [8] stressed how the higher education curriculum adds critical knowledge literacy. Novo and Bastos [9] stated that at university level the concept of literacy of knowledge remains problematic. It is less well known the importance of information literacy.

Schools and education systems should integrate technologically rich learning platforms and tools to understand the potential benefits of the changing emerging technologies and the interactive learning climate [10]. Information and communication technology (ICT) entry was regarded as positive regarding students' self-reported digital skills [11]. In contrast, Zhong found a negative link between the rate of ICT integration in different countries and the digital skills of young people. This result shows that an increase in the rate of ICT penetration without schools, in particular digital skills, does not enable young people to learn ICT in education. In addition, as technology is continuously evolving and complex, students need to continually develop their knowledge and skills [12]. In reality, high-performance workplaces use modern technology to increase productivity quickly. This development has contributed to fundamental changes in literature and the quality of organizational effectiveness [13], [14].

Today, higher learners are rapidly embedded in digital technology, allowing them to use these technologies and develop new technologies, scientists, and web designers. A lot of students want new technologies and benefit from them [15]. However, new technology continues to change students' lives [16]. This makes an online forum a way to save time, develop networking skills and educate people and enable people to keep up-to-date [12]. Margaryan *et al.* [17] declared that millenniums could not respond to modern technologies in the classroom. The implementation process thus affects their behavior target and the achievement of the learning process directly [18]. Learning management systems (LMS) is one of the most troubling higher education devices [19] such as Moodle, Blackboard, Edmodo, Sakai, and Google Classroom are LMS. Google Classroom recently increased its prominence, value, and the most rapidly adopted form of university education [20]. It is internet-free software that can be used to create and manage online courses for people with a Google account.

Google Classroom is one of the best online learning tools because it is innovative. The education group accepted a proposal from Google Classroom for the e-learning method. Technology is incorporated into classrooms. The widespread use of this revolutionary technology generated literature data. Teachers can support face-to-face learning through Google Classroom [21]. Google Classroom provides fresh and varied challenges in continuing education to teachers and students. First, everybody worldwide has a package called Google education apps tools and applications (such as Gmail and Google Drive) [22]. Second, Google Classroom usability is renowned [23] and its easy organization of work and time saving, fast access from tablet, personal computer, and cellular devices. According to estimates, Google Classroom got almost 30 million teaching and students' jobs in the first six months. The educational group, therefore, recommends Google Classroom strongly [22]. Finally, we offer the flexibility of Google Classroom in the programming process online, minimize travel costs and meet all the users. Google Classroom, a Google education program, will provide online education [24]. Google Classroom are highly recommended as they can be used anywhere and anytime via a smartphone. The students do not know about smartphones. Most of them already have Google teachings to do effective and creative learning [25].

Further study was also suggested to explore how these systems affect student training and equate user patterns with the actual goal of the system such that they are successful students. In using these technologies, the method must be evaluated in a given situation to genuinely and under no circumstances determine its effectiveness [26]. The main assumption is that technical advantages of hypocritical higher education cannot enhance learning by applying technology to traditional training [27]. Previous researchers [17], [28] also noted that even with a boom in educational technology capital, inadequate engagement and adaptation persist in the classroom. Students' initial acceptability and sensory inclinations to incorporate these emerging technologies into educational processes are partially the results. Consequently, students' use of such facilities is still limited, and it is important to resolve the reasons behind these habits. According to Jakkaew and Hemrungrote [20], further research into user engagement and comfort is needed while identifying methods for enhancing learning. Furthermore, if these instruments do not take responsibility, any technology used in the classes will not work, and revenues will drop well [29]. The location of Google Classroom mobile teaching. Bain *et al.* [30] recorded the acceptance and conduct of classes by Google in universities since the usage of literature by Google Classroom is reduced worldwide.

To find solutions to existing problems based on the concept above, an invention is necessary. Researchers used learning tools through online learning models at Google Classroom to solve those problems. This model also allows students to carry out experiments/study. Teachers must be careful not to supply the contents, since teachers will deliver them electronically via Google Classroom outside the classroom. During face-to-face class, the teacher will provide the details and interactions. The instructor will focus on student comprehension checks. Different fundamental natural laws may characterize chemical

processes. In that way, however, theoretical abstraction and rationale must be formulated and processed. Mathematical models often need quantitative formulas [30]. It is necessary to represent mathematically because students can easily solve abstract chemical issues [31]. Students also face a problem in chemistry with the aid of mathematical equations, which needs quantitatively to be solved to learn the skill of representing chemistry.

The goal of this research is to increase student information literacy ability by Google Classroom online learning. The research problems are: i) How is the impact of online learning through the Google Classroom on increasing student information literacy? ii) How is student perception of online learning through the Google Classroom is implemented?

2. RESEARCH METHOD

2.1. Design of research

The quantitative analysis design of this study included pre and post measuring of the learning outcomes of the respondents. The experimental design of this study was a one group pretest-posttest design [32]. The research design of this study is shown in Table 1. Teachers use Google Classroom for posting questions, connections, power points, photos, documents, games, guides, and tests. Students work on Google Classroom computers every day, such as daily question, power points, images, quests online, Google Docs, sports.

Table 1. Design of research

Subject	Pretest	Posttest
One group	O_1	O_2

O_1=pretest value before online learning through the Google Classroom
O_2=posttest value after online learning through the Google Classroom

2.2. Participant

This research involved 65 students from the Chemistry Course under the Biochemistry Program, Faculty of Science, Engineering at the Universitas Pendidikan Mandalika (UNDIKMA), Mataram, Indonesia. The courses included two hours theory and one-hour weekly courses. The tutorial includes teaching activities, lectures, and practical presentations. This is a precondition for LMS institutions, especially for online learning. Therefore, over the last six months or in another area both students have experience with LMS. However, the platform now provides little engagement and an exciting learning experience for many students, in particular. To that end, students have to download the Google Classroom application at the beginning of the semester. Registration for Google Classroom is compulsory. Teaching materials were available for students via slides and mobile (PDF) or YouTube videos before their lesson. Reading content was downloaded from student's mobile devices and read offline. The theory course conducted in a classroom with several students in order to improve their interaction with them was decisive in the advancement of the software requirements specification (SRS) into the Google Classroom. Also, relevant materials were submitting, handling, analyzing, and collecting feedback. An easy way to synchronize publications, correspondence, and note was another benefit of using the Google Classroom. These data are available through intelligent devices, and therefore Information must be disseminated promptly.

2.3. Research instruments

For this study, data in Google Form and questionnaire items were collected. Items are based on the evaluation model LMS, which tests students' commitment to content, communication, and the delivery of tasks. Students were questioned at the end of the semester. The test used to investigate the ability to read information was a fair query with many options. The questionnaire for student interpretation in Google Classroom focused on online learning consists of 18 statements. The tool is translated into Indonesian and reviewed by three Indonesian lecturers for the accuracy of the queries. A pilot test was then conducted to assess the questionnaire's reliability and validity. The distribution of information on questionnaire literacy ability is provided in Table 2.

2.4. Validity of the information literacy instrument

An expert validates the information literacy instrument prior to implementation. The method has been validated with 1-5 Likert scale objects (1=invalid to 5=very valid). As shown in Table 3, the score obtained from validators is converted into five-dimensional qualitative data [33].

Table 2. Aspect of information literacy

Component of information literacy	Indicator of information literacy	Items
Intermediate	– Define the relevant details – Select the most suitable information for the necessary information – Interpret the visual data (i.e. graphs, tables, diagrams) – Submit a research report – Preparation of bibliography – Build bibliographic records for various content types (i.e. books, articles, thesis, web pages) – Create quotes and use quotes in the document – Learn from success in problem solving	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Basic	– Using various types of printed sources (i.e. books, periodicals, encyclopaedias, chronologies) – Using electronic sources of information – Locate in the library information sources – Using the list of libraries – Using the library catalogue to locate tools in the library	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
Advanced	– Synthesize information newly obtained with previous information – Determine the material and the sections of a presentation (i.e. introduction, conclusion) (written, oral) – Create and arrange bibliographic records – Critique of the efficiency of the quest process and its items	21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Table 3. Criteria for the validity of the information literacy instrument

Validity interval (Va)	Criteria
Va>4.21	Very valid
3.40<Va<4.21	Valid
2.60<Va<3.40	Quite valid
1.79<Va<2.60	Less valid
Va<1.79	Invalid

2.5. Data analysis

The questionnaire comprises two variables: information literacy ability and students' perception of online learning through the Google Classroom. The survey was administered in one day to the participant. Each participant was requested to respond by a 5-point Likert scale (1=strongly disagree to 5=strongly agree). The questionnaire was distributed in August-September, 2020 using the Google Form. The gain of student information literacy was calculated based on the standardized T-test and Hake (1) score gain in this study with the assistance of SPSS 23.

$$\%g \frac{\%Sf-\%Si}{100-\%Si} x100\% \quad (1)$$

Where:
g=normalized gain
Sf=posttest score
Si=pretest score

Calculation results <g> are then seen in three classes of Hake [34] as shown in Table 4. The criteria to determine student perceptions regarding the use of Google Classroom [35] is shown in Table 5.

Table 4. Gain classification

Average gain	Criteria
0.00<g≤0.30	Low
0.30<g≤0.70	Medium
0.70<g≤1.00	High

Table 5. Student perception standard

Perception standard (%)	Criteria
0-20	Very negative
21-40	Negative
41-60	Netral
61-80	Positive
81-100	Very positive

3. RESULTS AND DISCUSSION

In this study, the instrument used to measure students' information literacy ability was tested for expert validity and through SPSS 23 analysis. The results obtained from the expert test were 4.22% which indicated that the overall information literacy instrument was in the very valid category. The results of the instrument validation can be seen in Table 6. The test results using SPSS 23 show that all the 30 items are considered valid, as shown in Table 7. The instrument used to measure information literacy ability was also analyzed using SPSS 23 (Cronbach's alpha) to determine the reliability of the instrument. The results showed that the reliability coefficient of the items is 0.86, as shown in Table 8 with very high criteria.

Table 6. The results of validation for information literacy instrument by experts

No	Feasibility indicators	Score percentages (%)	Category
1	Content	4.20	Valid
2	Language	4.24	Strongly valid
3	Presentation	4.22	Strongly valid
	Average values	4.22	Strongly valid

Table 7. The instrument validity from information literacy

Items	Pearson correlation	Sig. (2-tailed)	Category
1	.655**	.001	Valid
2	.865**	.001	Valid
3	.483**	.002	Valid
4	.565**	.000	Valid
5	.551**	.002	Valid
6	.566**	.001	Valid
7	.566**	.003	Valid
8	.555**	.004	Valid
9	.541**	.002	Valid
10	.554**	.001	Valid
11	.583**	.000	Valid
12	.627**	.001	Valid
13	.682**	.001	Valid
14	.746**	.001	Valid
15	.552**	.003	Valid
16	.876**	.001	Valid
17	.516**	.002	Valid
18	.656**	.001	Valid
19	.544**	.002	Valid
20	.521**	.002	Valid
21	.530**	.002	Valid
22	.590**	.000	Valid
23	.729**	.001	Valid
24	.541**	.002	Valid
25	.544**	.001	Valid
26	.646**	.001	Valid
27	.526**	.002	Valid
28	.647**	.003	Valid
29	.876**	.001	Valid
30	.555**	.000	Valid

Table 8. The reliability coefficient of information literacy coefficient

Cronbach's Alpha	N of items
0.86	30

3.1. The implementation of online learning through the Google Classroom

Google online learning process involves preliminary work, core tasks, and closing activities. The initial action was intended for students using an online learning media program in the Google Classroom. Students need to learn and talk through the Google Classroom in key activities. In contrast, the lecturer can supply a virtual laboratory for biochemistry practice in the Google Classroom. Students participate in the observation and study process individually. Students may also share their views at the closing events, complete the studied material, and conduct tasks at the end of each meeting.

The COVID-19 pandemic that demanded online learning did not enable lectures to be held on face-to-face basis. Researchers addressed online teaching through Google Classroom in this study. The Google Classroom method for the introduction of online learning requires time to start training. The teacher requests students to provide their information and email address via Google Classroom for the online learning process. This is to encourage teachers to register Google classes to train students to interact directly with teachers and peers. The description of the biochemistry material taught includes: i) Structure, properties, and chemical reactions of hydrocarbons; ii) Aerobic and anaerobic metabolism; iii) Citric acid cycle; iv) Respiration and energy chains (ATP); v) Disorders of carbohydrate metabolism; vi) Oxidation and energy structures in lipid; vii) Metabolism of ketone compounds; viii) Lipid biosynthesis; ix) Structure, properties, and reactions of vitamins & minerals; x) Genetic knowledge bias and flow in living systems.

3.2. The impact of the Google Classroom on increasing student information literacy ability

The data collected on students' information literacy before and after their online learning using Google Classroom are shown in Table 9. The table shows that mean X=77 in online learning and Mean X=73 in learning without online. This means that the average information literacy ability of students is higher through the use of Google Classroom than face-to-face so that the difference between the arithmetic mean is significant at α meaning-degree, the accompanying T-test analysis was carried out, and Table 10 shows the results of the analysis.

Table 9. Descriptive statistics of students' pretest and posttest information literacy abilities

Group	N	Mean	Std. Deviation	Std. Error mean
Pretest	65	73	5.60	.989
Posttest	65	77	5.36	.947

Table 10. Results of the t-test analysis on information literacy ability

		Levene's test for equality of variances		T-test for equality of means	
		F	Sig.	T	Df
Information literacy	Equal variances assumed	.971	.328	3.2	62
	Equal variances not assumed			3.2	61.8

The p-value equal to 0.002<0.05 can be seen in Table 9. It shows a substantial statistical difference in students' information literacy before and after learning via Google Classroom. The N-Gain test was performed to assess the increase in student knowledge literacy prior to and after Google Classroom usage and the results are presented in Table 11.

Table 11. Recapitulation results from N-gain

No.	Group	N	Ideal score	Value		N-Gain
				Minimum value	Maximum value	
1.	Pretest	60	100	50	60	0.33
2.	Post test	65	100	60	80	

The student information literacy is improved based on the results shown in Table 11. The observed pretest and post-test levels of N-Gain were in the range of 0.33 with the average category. It has been found in this study that online learning based on Google Classroom is effective in improving students' information literacy ability. This is evidenced by the results of student information literacy online through Google Classroom, which is 77 while non online (conventional) is 73. The reason for online learning based on Google Classroom is effective in improving students' information literacy skills because it can be done in

several ways: i) Training intermediate information skills students in obtaining the needed information sources; ii) Training students 'basic information skills in using information sources; and iii) Training students' advanced abilities in determining valid information sources. The findings obtained are consistent with research carried out by [36], in which the use of technologies like e-text and e-library has made students feel better as they can offer successful, innovative, and updated submissions. Previous study [37] found that students who make comprehensive and intensive use of technology appear to adapt learning strategies rapidly with different technical resources to help the learning process. Dolenc and Šorgo [38] showed that literacy of knowledge has a positive influence on academic performance. Information literacy can lead to productive activities through software and computer programs, including word processing and worksheets [39]. Mustofa *et al.* [40] described the results of research on the use of information literacy in different schools, which emphasizes various important points, including giving students room to choose topics, encouraging flexibility in the learning process, and growing communication capabilities among students by using modern technologies.

3.3. Student perception of the Google Classroom implemented

Student learning expectations identify student views on the learning model used during the training phase. Table 12 presents the findings of a student perception study on online learning using Google Classroom. The table shows that overall experiences of students from Google Classroom are positive. This is seen in the declaration indicators, specifically: i) Want to read were 46% answered agree; Lecture content easy to understand were 50% answered agree; ii) Encouraged to learn were 62.5% answered agree; iii) Reason for solving the problem were 68.75% answered agree; iv) Recognized and sharing your view were 75% answered agree; v) Learn to be autonomous were 37.5% answered agree; and vi) Acknowledgement of others from 80% to agree.

The results showed that students in Google Classroom have very positive view. The student experienced better in online learning. Megawanti [41] stated that online learning is an internet network online learning technique. As online learning makes listening to the learning process easier by using Android phones, tablets, or computers rather than only listening to the books an enjoyable learning technique for the students [42]–[44]. Students may also become less bored, interested, and involved in education by student learning with online learning [45]. Effective and enjoyable learning is based on students to actively engage in the learning process [46]. Online learning may enhance readability, build constructive perspectives, promote class discussions and improve the ability to read and think critically [47]–[49].

Table 12. Online learning perceptions students use Google Classroom

No.	Indicators	Statement (%)	Category
1	Want to read	100	Very positive
2	Lecture content easy to understand	98	Very positive
3	Encouraged to learn	96	Very positive
4	Reason for solving the problem	98	Very positive
5	Recognized and sharing your view	96	Very positive
6	Learn to be autonomous	100	Very positive
7	Acknowledgement of others	100	Very positive
	Average values	98	Very positive

4. CONCLUSION

Online learning through Google Classroom greatly influenced students' information literacy capabilities. It showed that the Google Classroom is much more effective than traditional learning. This study impacts how an efficient learning process can be implemented using Google Classroom. Policymakers may consider this for potential applications of the learning methods. Suggestions for future researchers to conduct similar research to investigate the Google Classroom learning effectiveness, especially in assessing information literacy from other learning areas such as digital literacy.

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