

PAPER • OPEN ACCESS

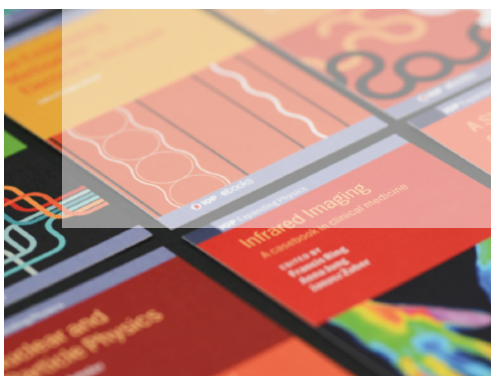
Implementation of Flipped Classroom on Experiences in Online Learning During Pandemic Covid-19 for a Project-Base Vocational Learning Guide

To cite this article: Sarwa *et al* 2021 *J. Phys.: Conf. Ser.* **1842** 012019

View the [article online](#) for updates and enhancements.



THE
Character Building
UNIVERSITY



IOP | ebooks™

Bringing together innovative digital publishing with leading authors from the global scientific community.

Start exploring the collection—download the first chapter of every title for free.

Implementation of Flipped Classroom on Experiences in Online Learning During Pandemic Covid-19 for a Project-Base Vocational Learning Guide

Sarwa¹, Rosnelli², Wahyu Triatmojo³, Mintoro Priyadi⁴

¹ Faculty of Engineering, Universitas Negeri Medan, Indonesia

² Faculty of Engineering, Universitas Negeri Medan, Indonesia

³ Faculty of Language and Arts, Universitas Negeri Medan, Indonesia

⁴ Faculty of Engineering, Universitas Negeri Medan, Indonesia

Email: ¹sarwa@unimed.ac.id, ²rosnelli@unimed.ac.id, ³wahyutriatmojo@unimed.ac.id,
⁴mintoro_priyadi@unimed.ac.id

Abstract. Online learning practices during the Covid-19 pandemic were completely carried out without being accompanied by face-to-face activities. This condition forces lecturers and students to adapt to new learning approaches by implementing online learning (e-learning). The research aims to develop a practical framework for Blended Learning (BL) implementation from best-practices and the concept of the flipped classroom (FC). The research method used is the ADDIE method (analysis, design, development, implementation, and evaluation). The research stage began with a survey of online learning service experiences had been using various online learning tools. The results of the inventory of best practices in online learning were used to compile the BL framework and integrate it with the FC framework as an alternative to vocational learning scenarios. The scenario of the BL framework was validated by the FGD technique. A vocational learning scenario called flipped training (FT) is applied in Online Classroom Management Training activities. The principle of implementing FT in online vocational learning begins with implementing project-based learning packaged in worksheets, class projects are presented in the LMS room and guided by video tutorials. After asynchronous delivery of project content, virtual face-to-face activities are carried out for confirmation and discussion of project execution preparation. At the end of the virtual face-to-face session, class participants were tested cognitively to ensure readiness for project execution. Production results are presented in video format, evaluated, and assessed on a rubric basis.

1. Introduction

Online learning (e-learning) in the era of internet technology is an inevitability that must be fulfilled by every higher education. One form of attitude that can be done is the management of classes online. Classroom management and systemic online learning are widely available and developed learning management system (LMS) applications, either developed by PT organizers or developed by software developers. Many LMS apps available either paid or non-paid (free) has been used by teachers independently without going through university-level admin management. The implementation of e-learning in its implementation is not separated by face-to-face classroom learning, so simultaneously or jointly practiced as a combination of offline and online or blended-learning (BL) classes.

The start-up implementation of BL practices at Medan State University (Unimed) has been implemented since 20007 through LMS Sipoel (online learning system) with Moodle platform. Over



time, Sipoel's application could not run effectively in the field. Strengthening the implementation of LMS-based online learning (SIPDA) has been carried out 3 semesters running in Unimed. General evaluation of bl implementation at Unimed has not obtained valid information based on research. In quantity, the number of lecturers applying has not been identified. The initial evaluation of the conditions of practice in the Faculty of Engineering (Sarwa, 2019) of lecturers who apply BL practices in the FT environment, indicates that the quality of lecturer services in online learning is still low.

Covid-2019 pandemic has positively forced Lecturers to get used to the practice of more intensive online learning services so that in total all lecturers in Unimed have implemented online learning. Qualitatively based on the application used and the quality of services provided by each lecturer has not been measured (identified). Bad experiences or practices or good practices have certainly been felt by teachers in preparing materials, preparing classes, carrying out learning, and conducting evaluations and assessments, all of which are digital and delivered online. Based on the practical online learning experience that is still fresh felt by all lecturers, a practical study is needed to be formulated as bl practice. Based on many reference practices BL should be supported by online applications [1], and lecturers' capabilities in multimedia literacy [2]. BL practice as a feature of century learning that can accommodate TPACK (Technological Pedagogical Content Knowledge) in preparing digital-based learning [3]. Judging by the harmonious and effective methods performed in online defense, the flipped classroom (FC) method is perfect for building the bath, flexibility (time, material) of class participants [4].

To expand the framework of online learning in bl scheme researchers will review the best practice during online learning in the case of Covid-19 emergency. Referring to the alignment of the FC model in online learning will be able to formulate mixed learning patterns (BL) in the course unit. How are online vocational learning practices implemented in real-time practiced by Lecturers at FT Unimed? Based on the best-practices online learning that has been done by lecturers, can be developed as a guide in vocational learning.

2. Blended Learning

The development of internet technology has huge benefits or implications for the world of education, especially in learning technology. Online learning technology has been able to accommodate almost all learning activities without physically presenting classes and teachers. Learning management system (LMS), simply defined software application for online learning activities. There are many popular apps like Google-Classroom, Edmodo, Moodle, Schoology, Latitude Learning, or others.

Google-Classroom released in 2017 for the free version can be operated with iOS and Android. The specialty of Google-Classroom will connect many other apps in the Google group, making it easy for Google users or account owners. The Google-Class theme with Google-Drive as a document store gives us a place to leave and collect external files (responses) or input files (materials and assignments) from Google-Class. The Google-Class theme with Gmail gives access (link) about various information or notifications of all transactions that occur in our classroom, e.g. class invitation notifications to prospective students (students) or team-teaching, especially about all assignment entry information, comments (discussions) from students all reported in our Gmail.

BL implementation may require support and institutionalized mechanisms; select a suitable method; need team support (administrative staff); collaborative work between teaching teams; and information technology system support [5]. The implementation of BL is partly an online learning practice that provides ease of time flexibility and meter will support the Free Learning program launched by the Minister of Education providing the choice of graduates can keep up with the times.

3. Blended Learning Practices and Effectiveness

The term 'blended learning' seems almost identical to 'hybrid learning', which allows materials and communication (delivery), as well as tasks combined with internet media and physical classes [6]. BL is simply learning that combines face-to-face activities in the classroom physically or face to face (F2F) with classroom activities through online classes (e-learning).

Some studies on the effectiveness of BL with highly effective GC applications can be based on student test results, student learning activities, and responses. Specifically showing GC increases student participation and learning and improves class dynamics [7]. The implementation of BL-GC was effectively implemented based on student test results (77.27%), observation of student activity (88.02%), and student response results (84.5%) [8]. After one semester implemented a learning management system (LMS) using GC, functionality, features, and effective student satisfaction and recommended GC to be an e-learning platform at Pangasinan State University (Philippines) [9].

The application of BL when reviewed based on the user's age according to Abazi. the effectiveness of the use of information technology in learning applications (LMS) will be successful for teachers who are a maximum of 39 years old, due to better mastery of IT literacy [10].

In terms of the scope of online classroom services, the lecturer's perception of the implementation of e-learning has not been able to improve the assessment process and interaction or discussion of lecturers. The implementation of new e-learning can improve the ease of delivery of materials and tasks from lecturers to students. In line with that, the perception of the use of e-learning according to students is very helpful in obtaining teaching materials (materials), receiving and sending assignments [11].

Evaluation of BL stubs for 2 semesters gives the conclusion that bl practice pedagogical can be applied to general teaching materials, for unique (specific) materials are still difficult to apply. One convenience and comfort felt by students is the ease of delivering or collecting tasks [12]. The effectiveness of BL usage can be seen from components, test results or learning achievements, learning activities, and student responses [8].

4. Flipped Classroom

A simple definition of the flipped classroom (FC) is reverse learning that applies problem-based learning with a material approach accompanied by tasks (exercises). FC implementation is highly compatible when supported by online-based learning technology [13]. Implementation of LMS-assisted Google Classroom is effective in producing learning [14].

Entrepreneurship learning models in European countries are applied in 5 BL models: 1) flipped classroom techniques, starting with delivering material before face-to-face; 2) blended online courses, teaching materials, and assessments online but supervised in the classroom; 3) online starter kits, apply kits or online modules to limited classes; 4) independent leveling-up, self-contained classes complete with materials and quizzes; and 5) online repository, providing teaching materials as material add-ons [15].

There are 5 (five) recommendations in implementing FC in practice [16] :

- a) Do not provide the same material for each class participant.
- b) Get used to assigning tasks in groups.
- c) Apply sessions in the classroom such as discussions, debates, collaborations, etc.
- d) Do feedback to be able to serve the learning barriers of each class participant.
- e) Not tempted to give more space in self-service activities, give a face-to-face portion of classes to ask questions, clarification, or validate students' understanding.

5. Research Methods

Research conducted using ADDIE (Analysis, Design, Development, Implementation, and Evaluation) method is recommended and suitable for curriculum design and learning [17]. The research phase begins with a survey to lecturers, with the following detailed stages: 1) analysis: preliminary survey results on online learning practices based on the experience of learning from home during the Covid-19 pandemic; 2) design: good practice and FC framework (flipped classroom); 3) development: the practical framework of mixed learning (BL) validated through FGD, and 4) implementation: class test; and 5) evaluation: test the effectiveness of implementation.

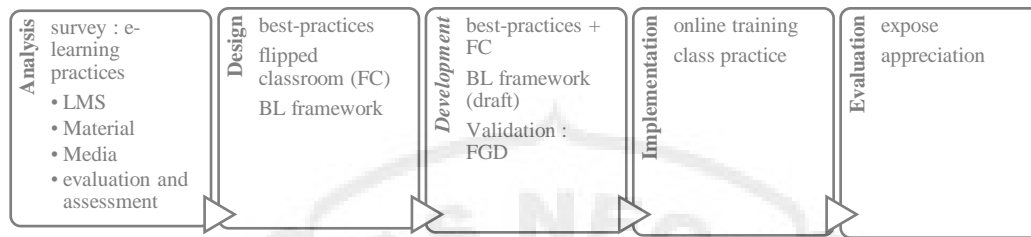


Figure 1. Research stage (ADDIE)

A preliminary study (analysis) was carried out to determine the practices of online learning during the implementation of "learning from home" from March to June 2020. The survey was conducted on FT Unimed Lecturers from 12th August to 1st September 2020.

6. Results

6.1. Best practices in Online Learning Services

The results of a preliminary study of online learning practices at the start of the Covid-19 pandemic with 54 respondents consisting of FT Unimed lecturers.

To see the quality of online learning, researchers conducted an exploration of 3 aspects of e-learning services: 1) asynchronous class services, 2) synchronous class services and dynamics, and 3) implementation of evaluation and assessment. The asynchronous class service referred to is the use of LMS in the delivery, collection, and discussion of class materials and assignments. Synchronous class services and dynamics are the use of class applications and activities during online meetings via video conference media. The evaluation and assessment were explored to see the applications used.

6.1.1 Asynchronous Class Services

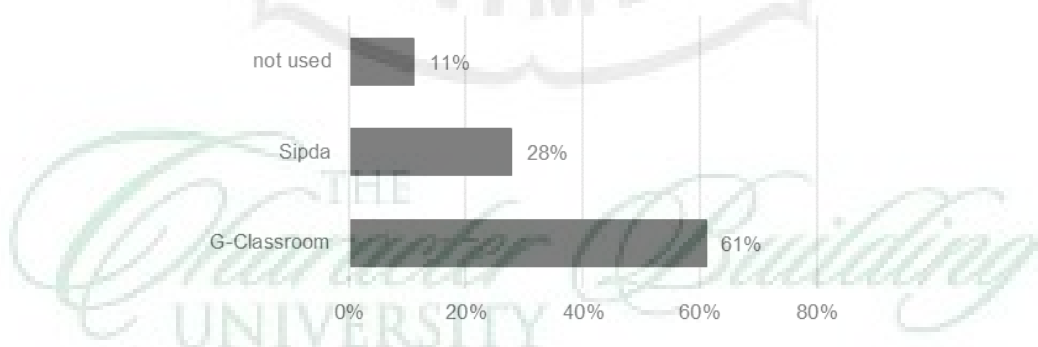


Figure 2. Online classroom management (LMS)

Based on Figure 2 most of the lecturers (61%) have used the LMS Google Classroom (28%) used Sipda in online classroom management, a few lecturers (11%) who have not used the LMS. Other media used for services support online classroom management, 81.5% of lecturers use webchat (WA: Whatsapp), and 59% use e-mail (Figure 3a). Based on (Figure 3b) shows that discussion activities were carried out through webchat (78%)

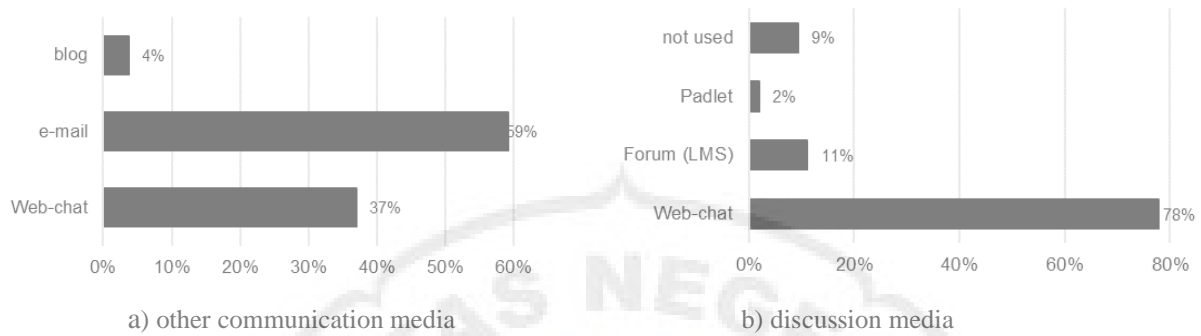


Figure 3. Other media (announcement and discussion)

6.1.1. Synchronous Class Service and Dynamics

To ensure the effectiveness of online learning services in addition to asynchronous services through LMS media, most (98%) of the lecturers have conducted face-to-face (F2F) online or virtual F2F activities through video conferencing. Most of the synchronous learning applications through Zoom virtual meetings (37%), Google-Meet (35%), and Webex (12%), BigBlueButton (16%) (Figure 4).

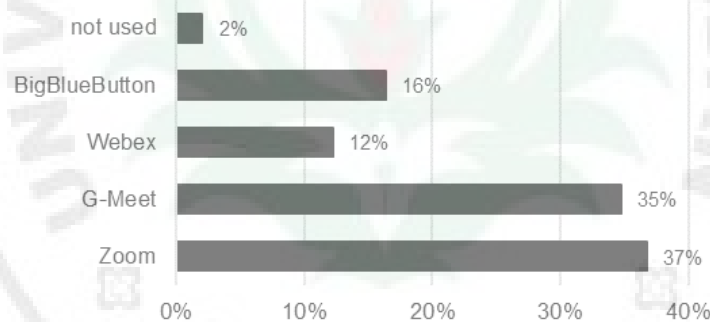


Figure 4. Virtual meeting platform

To see the dynamics of the class during virtual meetings, Figure 5 (a) shows that the majority (83%) of lecturers have not used special tools for discussion during virtual meetings. Figure 5 (b) shows the only (31%) use special applications for quiz application. Based on the information, most of the lecturers may use virtual meeting sessions to deliver material or discussions without the use of special tools to build more interactive class dynamics. Based on this description, lecturer-student engagement has not been well developed.

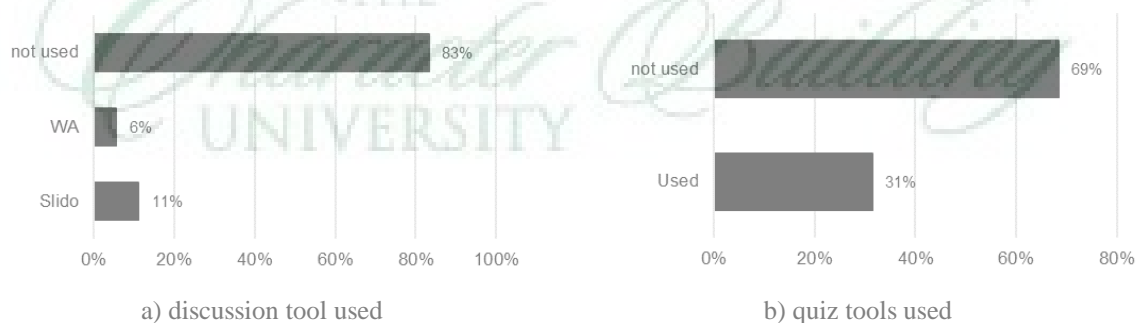


Figure 5. Class engagement tools (discussion and quiz)

6.1.2. Evaluation and Assessment

The implementation of evaluation and assessment in online learning certainly requires an online-based application. To find out which application, pictures 6 shows that most (37%) use Google Form as a tool in the implementation of evaluation and assessment, 30% use social media (WA and e-mail), and

28% use LMS (integrated). The use of Google Forms and LMS (55%) as evaluation and assessment tools are appropriate as instruments in evaluation and assessment. Base on picture 3 and picture 6 shows that the use of WA and e-mail is still widely applied in online learning practices for material delivery and assignment (evaluation and assessment), as well as for discussion forums. Based on this information, there are quite a lot of online classroom management practices based on social media applications that are not as effective as LMS.

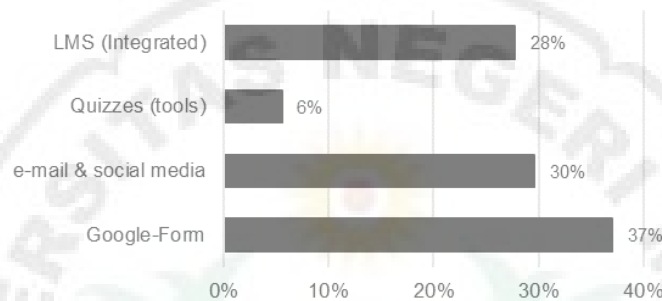


Figure 6. Evaluation and assessment tools

6.2. Flipped Classroom Schemes and Scenarios

To develop and practice schemes and scenarios for flipped classrooms, researchers conducted a practice in the "Online Classroom Management Training" class. This training is based on the results of a preliminary study which requires increased competence and is carried out in 5 sessions with the following materials: 1) class management; 2) content development; 3) evaluation and assessment; 4) engagement; 5) heutagogy and cyber pedagogy; and 6) flipped classroom. The training is carried out online using the Flipped Training approach. Training class participants are invited to join the WA-group media, digital teaching materials, and exercises (worksheets) are delivered asynchronously through the class (G-Classroom). For in-depth, confirmation, or discussion of the material or assignment that has been delivered (G-Classroom) is carried out through virtual meetings. The learning experiences from the training that have been carried out are 1) Identifying various tools for online learning; 2) development of digital materials and online tests; 3) online classroom management, and 4) flipped-classroom practice. The output of the training is an online classroom management experience using the flipped classroom approach. Graphically a simple guide in online learning practice is shown in Figure 7.

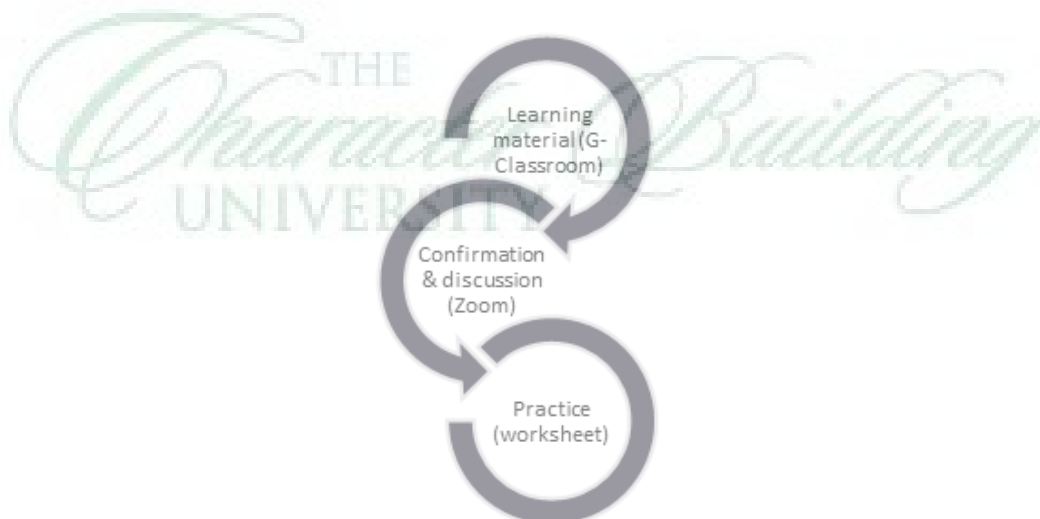


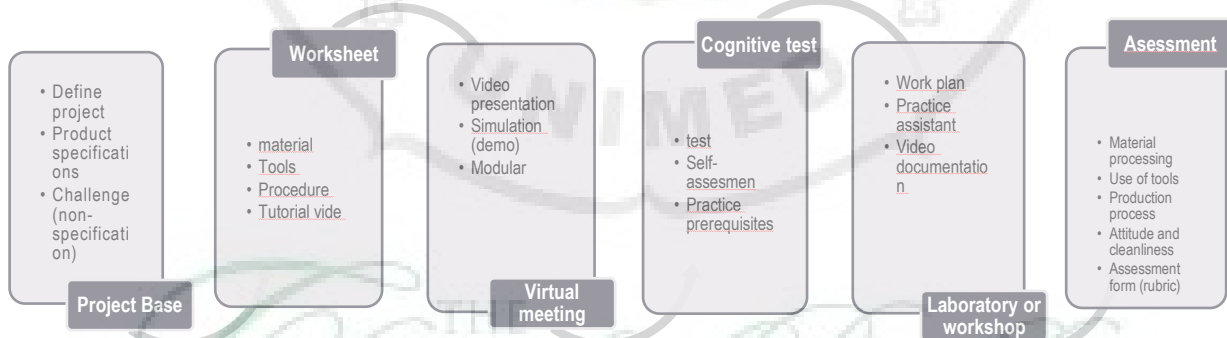
Figure 7. Flipped Classroom scheme

Table 1. Flipped Classroom Practices in Online Classroom Management Training

No.	Media	Content	Application	Platform
1.	Delivery	1) Training syllabus 2) Lesson plan 3) Training material	LMS	Google Classroom & Sipda (Moodle)
2.	Announcements	1) Information and announcements 2) Class schedule 3) Invitation for training sessions	Social media	Whatsapp
3.	Virtual meeting	1) Confirmation and discussion 2) Simulation and demonstration	Video conference	Zoom
4.	Worksheet	1) Classwork (practices) 2) Evaluation and assessment	LMS	Google-Classroom & Sipda (Moodle)

6.2.1. Practical Guide for Flipped Classroom Project-based Vocational Learning

Based on practical experience in the Online Classroom Management Training and FC learning framework that can be applied in vocational learning. Referring to research on vocational learning practices in higher education readiness and technology support is needed in material development (video), evaluation of learning that builds higher-order thinking competencies, builds lecturer-student engagement by applying online technology [18]. A practical guide for implementing FC step by step in project-based vocational learning is presented in Figure 8.

**Figure 8.** FC step by step in project-based vocational learning

6.2.2. Step-1: define the project (media: LMS)

The learning method applied is project-based, define a project or product with specifications.

6.2.3. Step-2: worksheet (media: LMS)

The worksheet is a real guide to realizing the product or project defined in step-1. Worksheets contain product specifications and descriptions, assign them as projects or as challenges. Supporting media for worksheets is a video tutorial that contains guidelines for making products. This video tutorial demonstrates the process of selecting materials, using tools, and the production process.

6.2.4. Step-3: demonstration and simulation (media: virtual meeting)

Virtual face-to-face activities are to provide tips and tricks that are important to know in project completion. The teacher must demonstrate the project that will be made as a simulation by practicing the whole series or checking and explaining the video tutorial that has been delivered.

6.3. Step-4: cognitive tests (media: online test)

A cognitive test in the form of a written test is one way to evaluate the readiness to complete a product before entering a laboratory, workshop, or studio.

6.3.1. Step-5: the production process (media: workshop or studio)

The production process or product manufacturing can be done in a laboratory, workshop, or studio or in other places with or without assistance. The production process must be recorded into video documentation as a report and learning output.

6.3.2. Step-6: assessment (media: LMS or Youtube)

Assessment of learning outcomes is carried out from video documentation. Assessment criteria include processing of materials, use of tools, production processes, and presentation of results (products). The assessment instrument is presented in digital form online using Google Form or offline digital assessment using Excel.

7. Conclusions and Recommendations

The practical implementation guide for the flipped classroom in project-based vocational learning requires 6 stages: 1) challenge the project (product); 2) use of worksheets and video tutorials; 3) simulation and demonstration; 4) pre-test (cognitive); 5) production (workshop/studio); and 6) product assessment.

Acknowledgments

This research was funded by the BOPTN Universitas Negeri Medan research scheme in 2020.

References

- [1] L. B. Ni, "Blended Learning through Google Classroom," vol. 14, no. 4, pp. 220–226, 2020.
- [2] G. E. Crane, "Crane, G. E. (2016). Leveraging Digital Communications Technology in Higher Education: Exploring URI's Adoption of Google Apps for Education 2015.," 2016, [Online]. Available: <http://digitalcommons.uri.edu/theses/870>.
- [3] S. K. Apau, "Technological Pedagogical Content Knowledge Preparedness of Student-Teachers of the Department of Arts and Social Sciences Education of University of Cape Coast," *J. Educ. Pract.*, vol. 8, no. 10, pp. 167–181, 2017.
- [4] C. O. Kara, "Flipped Classroom," *Toraks Cerrahisi Bul.*, vol. 9, no. 3, pp. 224–228, 2015, doi: 10.5152/tcb.2015.064.
- [5] A. H. Maarop and M. A. Embi, "Implementation of Blended Learning in Higher Learning Institutions: A Review of Literature," *Int. Educ. Stud.*, vol. 9, no. 3, p. 41, 2016, doi: 10.5539/ies.v9n3p41.
- [6] A. Bryan and K. N. Volchenkova, "Blended Learning: Definition, Models, Implications for Higher Education," *Bull. South Ural Univ. Ser. "Education. Educ. Sci.*, vol. 8, no. 2, pp. 24–30, 2016, doi: 10.14529/ped160204.
- [7] K. R. Heggart and J. Yoo, "Getting the most from google classroom: A pedagogical framework for tertiary educators," *Aust. J. Teach. Educ.*, vol. 43, no. 3, pp. 140–153, 2018.
- [8] R. P. Murtikusuma, Hobri, A. Fatahillah, S. Hussien, R. R. Prasetyo, and M. A. Alfarisi, "Development of blended learning based on Google Classroom with osing culture theme in mathematics learning," *J. Phys. Conf. Ser.*, vol. 1165, no. 1, 2019, doi: 10.1088/1742-6596/1165/1/012017.

- [9] R. J. M. Ventayen, K. L. A. Estira, M. J. De Guzman, C. M. Cabaluna, and N. N. Espinosa, "Usability Evaluation of Google Classroom: Basis for the Adaptation of GSuite E-Learning Platform Software Management View project Data Analysis View project," *Asia Pacific J. Educ. Arts Sci.*, vol. 5, no. 1, pp. 47–51, 2018.
- [10] L. Abazi-Bexheti, A. Kadriu, M. Apostolova-Trpkovska, E. Jajaga, and H. Abazi-Alili, "LMS Solution: Evidence of Google Classroom Usage in Higher Education," *Bus. Syst. Res.*, vol. 9, no. 1, pp. 31–43, 2018, doi: 10.2478/bsrj-2018-0003.
- [11] T. (2018). Amelia, "Jurnal Mahasiswa Pendidikan Ekonomi Penggunaan media pembelajaran berbasis e-learning studi persepsi dan harapan dosen dan mahasiswa Jurnal Mahasiswa Pendidikan Ekonomi Volume 1 , Nomor 3 , 1 Februari 2018 Penggunaan media pembelajaran berbasis e-learning," vol. 1, 2018.
- [12] O. Calderon, A. P. Ginsberg, and L. Ciabocchi, "Multidimensional Assessment of Pilot Blended Learning Programs : Maximizing Program Effectiveness," *J. Asynchronous Learn. Networks*, vol. 16, no. 3, pp. 23–37, 2012.
- [13] F. Ozdamli and G. Asiksoy, "Flipped Classroom Approach," *World J. Educ. Technol.*, vol. 8, no. 2, p. 98, 2016, doi: 10.18844/wjet.v8i2.640.
- [14] M. Kurniawati, H. Santanapurba, and E. Kusumawati, "Penerapan Blended Learning Menggunakan Model Flipped Classroom Berbantuan Google Classroom Dalam Pembelajaran Matematika Smp," *EDU-MAT J. Pendidik. Mat.*, vol. 7, no. 1, pp. 8–19, 2019, doi: 10.20527/edumat.v7i1.6827.
- [15] G. Pisoni *et al.*, "Towards Blended Learning Implementation of Innovation and Entrepreneurship (I&E) Education Within Eit Digital: the Models and Lessons Learnt," *EDULEARN18 Proc.*, vol. 1, pp. 10496–10502, 2018, doi: 10.21125/edulearn.2018.2553.
- [16] M. Hartyányi *et al.*, "Innovating Vocational Education. Flipped classroom in practice," no. December, 2018, [Online]. Available: <https://abacus.universidadeuropea.es/handle/11268/7955>.
- [17] L. Cheung, "Using the ADDIE Model of Instructional Design to Teach Chest Radiograph Interpretation," *J. Biomed. Educ.*, vol. 2016, pp. 1–6, 2016, doi: 10.1155/2016/9502572.
- [18] J. O'Flaherty and C. Phillips, "The use of flipped classrooms in higher education: A scoping review," *Internet High. Educ.*, vol. 25, no. May, pp. 85–95, 2015, doi: 10.1016/j.iheduc.2015.02.002.