

Development of an Online Learning Lesson in the Educational Technology Equipment Operation Course for Pre-Service Teachers

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Abstract—The objectives of this study are (1) to explore pre-service teachers' needs in using educational technology tools for online learning, (2) to develop an online lesson about the use of educational technology tools for pre-service teachers, and (3) to compare the learning achievements before and after taking the lesson. This project comprised research and development, with the methodology divided into three phases. The first phase was a needs assessment, the second phase was a development of an online lesson about the use of educational tools, and the third phase was a comparison of the learning achievements before and after completing the lesson. The results were as follows: (1) In respect of the needs analysis concerning the use of educational technology tools in online learning, the pre-service teachers considered that tools for completing learning tasks were the most crucial element. The data collected from open-ended questions revealed that the most critical problems experienced in online learning were learning tools and poor Internet speed. (2) The results from the suitability test showed that the developed online lesson was suitable overall. The pre-service teachers' average post-test score for the achievement test on the use of educational technology tools was higher than the average pre-test score, with a statistically significant difference at a level of .05.

Keywords—online course, educational technology tools, pre-service teachers

1 Introduction

The world has changed dramatically due to the COVID-19 pandemic. Many universities and institutions in almost every region of the globe switched to online or remote learning, which had a variety of repercussions for student learning. [1] In the field of education, physical classrooms turned into online classrooms to help prevent the spread of the pandemic, and universities started to offer online learning courses. University lecturers have been responsible for designing and developing these online learning lessons [2], which were created with a sense of urgency.

The design and development of online lessons are undertaken in various ways. Instructors may choose the method that suits them, and the development of online lessons may lack the usual level of effectiveness, or they may be put to trial rapidly

due to the occurring COVID-19 situation. It is recommended that the design of online courses provide a better communication channel between instructor-student. [3]

Online learning lessons refer to lessons accessible via web browsers on mobile devices through the Internet or a computer networking system anywhere, anytime. They contain online learning environments that facilitate asynchronous learning in which students can access the program structure and lessons and communicate with peers and instructors [4]. Currently, there are various e-learning platforms (e-class, Edmodo, Moodle, e-Me [5] In this study, online learning lessons are available on Moodle. This learning management system allows instructors to upload lessons and choose appropriate learning tools, creating a learning environment for each learner at no cost [6].

Practical online lessons vary in formats and means of assessment and evaluation. They allow learners to create their own learning experience, enhance their self-regulated learning skills, and reflect on their learning while promoting individual learning awareness. The presentation of online lessons must be clear, engaging, and compelling.

At the same time, various types of educational media, such as online documents, podcasts, videos, PowerPoint slides, presentations, assessments, digital files, additional resources, and worksheets, are utilized [7][8]. Digital repositories emerge, such as emotional data and data triplets of various events' educational activities [9]. Students enjoyed the exercise of learning apps as games. [10]

The Educational Technology Equipment Operation course is an elective course for students studying in the Bachelor of Education Program in the School of Education at the University of Phayao. The course content consists of basic knowledge of electricity and electronics, basic operations of educational technology tools, and appropriate use of materials, tools, projection systems, sound amplification systems, printing systems, and computer networking systems with proper maintenance [11]. During the COVID-19 pandemic, the researcher had to conduct this course online; therefore, online lessons for this particular course have been created.

As the course instructor, the researcher realized the importance of online learning and teaching management during the COVID-19 pandemic and wished to explore the need to use educational technology tools for online learning and the learning achievement of pre-service teachers who undertake this course.

1.1 Research objective

1. To identify the need to use educational technology tools for online learning.
2. To develop online learning lessons about educational technology tools.
3. To compare the learning achievement of pre-service teachers before and after taking the Educational Technology Equipment Operation course.

1.2 Operational definitions

Online lessons refer to an organized set of contents, activities, instructional media, assessment, and evaluation used in the Educational Technology Equipment Operation course available in a learning management system.

The Educational Technology Equipment Operation course refers to a course that consists of basic knowledge of electricity and electronics, basic operations of educational technology tools, and appropriate use of materials, tools, projection systems, sound amplification systems, printing systems, and computer networking systems with proper maintenance.

The online lessons included in the Educational Technology Equipment Operation course consist of 6 modules, (1) Educational Technology Tools, (2) Basic Knowledge of Electricity and Electronics, (3) Projectors, (4) Stereos, (5) Use of Audio-Visual Equipment, Stereos, Projectors, and Live Streaming, and (6) Printing.

2 Methodology

This research and development study was divided into 3 phases.

2.1 Phase 1 Needs analysis of the use of educational technology tools in online learning

The research population in this phase is undergraduate pre-service teachers at the School of Education, University of Phayao.

The research samples were undergraduate pre-service teachers studying in the third semester of the Academic Year 2021 at the University of Phayao. The sample size was calculated using G*Power [12] as the effect size (F) was .25, the probability of Type I error (α err prob) was .05, and the power of the test ($1-\beta$ err prob) was .95. The estimated sample size was at least 34 respondents. However, to make up for the incomplete returned questionnaires, the researcher increased the sample size by 50%, making the sample size of at least 51 respondents. The data was collected from 272 pre-service teachers using purposive sampling. The characteristics of the samples included (1) enrolling in the Educational Technology Equipment Operation course and (2) being third-year undergraduate students, as they had taken online courses for more than one semester.

The research instrument used in this phase was the needs analysis questionnaire on the use of educational technology in online learning. The content validity was calculated using the Index of Item-Objective Congruence (IOC) by Rovinelli and Hambleton [13]. Five experts involved in this examination consisted of three from the field of educational technology and two from the field of educational measurement and evaluation. The IOC was used to evaluate the questionnaire items based on a score range of -1 to +1. According to the review on IOC, the overall validity of the questionnaire was .993, and those of the items ranged from .667 to 1.000, while the overall reliability was .964. The questionnaire was divided into three parts: **Part 1** Questions on general information of respondents (sex and major of study) in a check-list format,

and **Part 2** Five-point rating scale questions on the use of educational technology in online learning in a dual-response format, one questionnaire, respondents must have answered two sets of information on the current usage level and the level of expectation in using educational technology tools in online learning, a total of 26 questions, and **Part 3** One open-ended question on problems and obstacles in online learning.

To collect the data, the researcher organized a session to explain instructions and answer questions from the samples before distributing the online questionnaire. The process was approved by the University of Phayao Human Ethics Committee (Project No.: UP-HEC 2.1/026/64). Informed consent forms were distributed to volunteers aged 20 and older to explain the research objectives, duration, methodology, and benefits. After reading and understanding all the information regarding this research, sample participants completed the online informed consent form and accessed the questionnaire section.

For data analysis, needs identification was conducted using the Modified Priority Needs Index (PNI_{modified}) with a five-level rating scale. PNI_{modified} was used to prioritize the needs, and a Modified Priority Needs Index (PNI) analysis was used for prioritizing needs [14]. The data collected from the open-ended questions were grouped based on the contents.

2.2 Phase 2 Development of online lessons for the Educational Technology Equipment Operation course

In this phase, online lessons were developed based on the data collected from Phase 1.

The research samples were three experts with at least five years of experience in the fields of instructional design, educational technology, and assessment and evaluation.

The research instrument used in this phase was a suitability test for online learning lessons. The 3-point scale was used in this assessment, and the average suitability was found at .838, and those of the items ranged from .667 to 1.000.

2.3 Phase 3 Comparison of learning achievement of pre-service teachers before and after taking the Educational Technology Equipment Operation course

In this phase, a quasi-experiment was conducted to compare the learning achievement of the pre-service teachers before and after completing the Educational Technology Equipment Operation course online.

The research population was undergraduate pre-service teachers studying at the School of Education, University of Phayao.

The research samples were undergraduate pre-service teachers studying in the third semester of the Academic Year 2021 at the University of Phayao. The size of the samples was determined using G*Power [6] as the effect size (F) was .25, the probability of Type I error (α err prob) was .05, and the power of the test ($1-\beta$ err prob) was .95. The estimated sample size was at least 34 respondents; however, to make up for

the incomplete returned questionnaires, the researcher increased the sample size by 50%, making the sample size of at least 51 respondents. The data were collected from 112 pre-service teachers using purposive sampling. The characteristics of the samples included (1) enrollment in the Educational Technology Equipment Operation course and (2) being third-year undergraduate students, as they had taken online courses for more than one semester.

In this phase, the research instrument used for data collection was an achievement test on the use of educational technology, which included 43 four-option multiple-choice questions, 6 of which were about educational technology tools, 11 about basic electricity, eight about projectors, five about stereos, eight about the use of audio-visual aids, stereos, projectors, and live streaming, and 5 were about print media. The overall validity of the test was .806, and those of the items ranged from .667 to 1.000, while the overall reliability coefficient of Kuder-Richardson 20 (KR20) was .953. The overall difficulty index was .553, and those of the items ranged from .230 to .800. The average discrimination power of .549, and those of the items ranged from .404 to .730.

As for the data collection process, the researcher contacted the pre-service teachers to explain the research methodology and had the sample participants take the pre-test before starting the 6-week online lessons. After completing all the tasks, they were asked to take the post-test. The details are listed in Table 1.

Table 1. Data collection process

WK	Objective	Content	Activity	Tool	Instructional Media	Assessment and Evaluation
1	To enable students to identify the meaning, significance, differences, strengths, and limitations of educational technology tools	Educational technology tools	(1) Students take the pre-test. (2) Students anonymously type the definition of "educational technology tools" on the discussion board. (3) Students watch the instructional videos and study the supplements and PowerPoint slides. (4) Students take the post-test.	- Padlet - Google Form - Google Sheet	- PowerPoint presentation - Supplemental documents - Instructional videos	- Pre-test and post-test
2	- To enable students to identify the meanings of basic terms related to electricity and electrical circuit - To enable students to use educational	Basic knowledge of electricity and electronics	(1) Students take the pre-test. (2) Students watch the instructional videos and study the supplements and PowerPoint slides. (3) Students take the post-test.	- Google Form - Google Sheet - Discussion board	- PowerPoint presentation - Supplemental documents - Instructional videos	- Pre-test and post-test

WK	Objective	Content	Activity	Tool	Instructional Media	Assessment and Evaluation
	technology tools in a safe manner					
3	<ul style="list-style-type: none"> - To enable students to choose projectors appropriate to the setting - To enable students to adjust the projector and screen accurately 	Projectors	(1) Students take the pre-test. (2) Students watch the instructional videos and study the supplements and PowerPoint slides. (3) Students complete worksheets on projectors by (3.1) using mind mapping to summarize the contents on projectors and (3.2) choosing projectors appropriate to classrooms and medium/large meeting rooms with sufficient reasons. (4) Students take the post-test.	<ul style="list-style-type: none"> - Google Form - Google Sheet - Discussion board 	<ul style="list-style-type: none"> - PowerPoint presentation - Supplemental documents - Instructional videos 	<ul style="list-style-type: none"> - Pre-test and post-test - Worksheet on projectors
4	<ul style="list-style-type: none"> - To enable students to identify components of stereos - To enable students to choose microphones, amplifiers, and speakers appropriate to the settings 	Stereos	(1) Students take the pre-test. (2) Students watch the instructional videos and study the supplements and PowerPoint slides. (3) Students complete the worksheet on stereos by (3.1) using mind mapping to summarize the contents on stereos and (3.2) choosing stereos appropriate to classrooms and medium/large meeting rooms with sufficient reasons. (4) Students take the post-test.	<ul style="list-style-type: none"> - Google Form - Google Sheet - Discussion board 	<ul style="list-style-type: none"> - PowerPoint presentation - Supplemental documents - Instructional videos 	<ul style="list-style-type: none"> - Pre-test and post-test
5	<ul style="list-style-type: none"> - To enable students to install wires and cables of audio-visual equipment - To enable students to design the use of sound systems, projectors, and live 	Basic operations of audio-visual equipment, stereos, projectors, and live-streaming systems	(1) Students take the pre-test. (2) Students watch the instructional videos and study the supplements and PowerPoint slides. (3) Students complete the projector and stereo operations	<ul style="list-style-type: none"> - Google Form - Google Sheet - Discussion board 	<ul style="list-style-type: none"> - PowerPoint presentation - Supplemental documents - Instructional videos - Demonstration videos on operations and operations of audio- 	<ul style="list-style-type: none"> - Pre-test and post-test - Worksheet on wire and cable installation - Worksheet on live streaming system

WK	Objective	Content	Activity	Tool	Instructional Media	Assessment and Evaluation
	streaming systems		worksheet by drawing an installation map of wires and cables with the signal direction in different settings and creating a 3-minute video. (4) Students complete the worksheet on designing live streaming systems using the designed installation map in the first worksheet to set up live streaming with appropriate equipment and create a 3-minute video. (5) Students take the post-test.		visual equipment	design
6	To enable students to design effective printing media	Printing	(1) Students take the pre-test. (2) Students watch the instructional videos and study the supplements and PowerPoint slides. (3) Students complete the worksheet on printing media design by designing a poster and cover for online lessons. (4) Students take the post-test.	- Google Form - Google Sheet - Discussion board	- PowerPoint presentation - Supplemental documents - Instructional videos	- Pre-test and post-test - Worksheet on printing media design

The collected data was analyzed using descriptive statistics, including means and standard deviations, and the difference in online learning achievement was analyzed using a dependent sample t-test.

3 Results

The results are divided into three parts according to the research objectives: (1) Results of needs analysis of the use of educational technology tools in online learning, (2) Results of developing online lessons for the Educational Technology Equipment Operation course, and (3) Results of comparing learning achievement of pre-service teacher before and after taking the Educational Technology Equipment Operation course. The details are as follows:

3.1 Part 1 Results of needs analysis of the use of educational technology tools in online learning.

The needs analysis of the use of educational technology tools in online learning revealed that the most needed tools in online learning were those used to complete online activities ($PNI_{modified}=.321$), those used to support online learning ($PNI_{modified}=.236$) and learning management systems ($PNI_{modified}=.154$), respectively. It is important to note that the highest $PNI_{modified}$ was much higher than the $PNI_{modified}$ values of the second and the third needs, as shown in Table 2.

Table 2. Results of needs analysis of the use of educational technology tools in online learning among pre-service teachers (n = 272)

Needs analysis of the use of educational technology tools in online learning	Needs condition of the use of educational technology tools in online learning		PNI modified	Order of Priority
	Expected condition (I)	Actual condition (D)		
1. Tools used to do activities	15.39	11.65	.321	1
2. Online learning devices	3.45	2.79	.236	2
3. Learning management system	3.88	3.36	.154	3
4. Instructional media	4.21	3.68	.144	4
5. Communication tools	3.97	3.59	.105	5
6. Online learning activities	5.46	5.05	.081	6

The needs analysis results of using educational technology tools in online learning obtained from the samples' answers to the open-ended questions revealed several key issues worth discussion;

First, many pre-service teachers lacked online learning tools, such as desktop computers, laptops, and tablets, which can be used in various ways to facilitate online learning. They also experienced problems with the Internet connection.

Second, many pre-service teachers found it difficult to search for content, instructional media, activities, and assignment submission channels on the learning management system. There were no notifications to remind students of assignment submission deadlines or to alert students of the instructor's new posts. Additionally, the interface was not user-friendly, making it complicated for students to navigate and quickly find what they needed.

Third, in the pre-service teachers' opinion, the same learning activities were repeated in the lessons. There was neither interaction with classmates nor actual practice. Most of the assignments were completed in a group. It was difficult for students who did not know one another before to work together, which was different from working as a group in a physical classroom.

Next, the learning environment experienced by the pre-service teachers was not suitable for online learning as they studied from home or a dormitory. There was inadequate light, disturbing ambiance, and poor ventilation. Unlike physical classrooms, they lacked items or tools to facilitate their learning.

Finally, regarding assessment and evaluation, the pre-service teachers found that the workload was overly heavy and the time was limited. In addition, there was no link between different courses, resulting in a large number of separate assignments in total.

3.2 Part 2 Results of developing online lessons for the Educational Technology Equipment Operation course

Regarding the suitability test of the online lessons using a 3-point rating scale (1 = Inappropriate, 2 = Uncertain, and 3 = Appropriate), in the view of the experts, the designed learning environment was suitable ($M = 2.98$, $SD = .174$) as shown in Table 3.

Table 3. Suitability test results of the Educational Technology Equipment Operation online course (n = 3)

Criteria	<i>M</i>	<i>SD</i>	Opinion
1. Contents	3.00	.00	Appropriate
2. Learning activities	3.00	.00	Appropriate
3. Instructional media and supporting tools	2.93	.45	Appropriate
4. Communication and interaction	3.00	.00	Appropriate
5. Screen design	3.00	.00	Appropriate
6. Learning support	3.00	.00	Appropriate
7. Assessment and evaluation	3.00	.00	Appropriate
Total	2.98	.174	Appropriate

3.3 Results of revising the Educational Technology Equipment Operation online course

In this phase, the researcher took the opinions and suggestions obtained from their answers to the experts' open-ended questions into consideration and revised the online lessons by addressing these three issues: (1) instructional media, (2) content, and (3) learning activities.

First, concerning instructional media, the experts suggested that a variety of instructional media should be added, especially instructional videos on the use of educational technology tools to present information. The researcher, therefore, selected online resources on social media, collected the videos previously created for previous courses, and made them available via embedded links. There were texts to signal the pre-service teachers to access the resources. For example, the researcher added (1) videos created during the study on the effects of inserting 5W1H questions in lecture videos on demand via Web 2.0 on undergraduate students' learning achievement and problem-solving ability. The videos were about sound systems and projectors:

(1.1) History and significance of projectors, (1.2) Components of projecting and projectors, (1.3) projector systems, (1.4) types of projectors, (1.5) positioning projectors

and screens, (1.6) History and significance of sound systems, (1.7) sound, frequency, and volume, (1.8) Sound systems and components of stereos, (1.9) Microphones, and (1.10) Operation and maintenance of microphones. In addition, the researcher also included (2) videos from the Asayhi Channel, and a YouTube channel about live streaming equipment, as additional resources in the lessons.

Second, the experts found some content on the operations of stereos and projectors, and live streaming was briefly summarized. Further elaboration would be beneficial for the students. The researcher then added more details to the content and included them in the instructional videos, supplements, and websites so that the pre-service teachers could seek in-depth information about the operations of stereos and projectors and live streaming.

Third, the experts suggested that more synchronous learning activities should be added to allow the students to exchange opinions and share problems and obstacles they encountered while using projectors, stereos, and live-streaming equipment. In addition, there should also be synchronous assessment after completing the lessons.

3.4 Part 3 Results of comparing the learning achievement of pre-service teachers before and after taking the Educational Technology Equipment Operation course

Technology Equipment course, it was clear that the average score on the post-test ($M = 39.17$, $SD = 2.84$) was statistically higher than that of the pre-test ($M = 26.51$, $SD = 6.78$) at a .05 level of significance. This applied to both the overall and individual domain scores, as shown in Table 4.

Table 4. Comparison results of the learning achievement of the pre-service teachers before and after taking the Educational Technology Equipment Operation course ($n = 112$)

Learning Achievement	<i>M</i>	<i>SD</i>	<i>T</i>	<i>Sig.</i>
Before	26.51	6.78	14.93	.000*
After	39.17	2.84		

* $p < .05$

4 Conclusion

The needs analysis of the use of educational technology tools in online learning revealed that the most needed tools in online learning were those used to complete online activities and those used to support online learning and learning management systems.

Regarding the suitability test of the online lessons, in the view of the experts, the designed learning environment was suitable for the Educational Technology Equipment Operation course. It was clear that the average score on the post-test was statistically higher than that of the pre-test at a .05 level of significance.

5 Discussion

The results are discussed in 3 sections: (1) Results of the needs analysis of the use of educational technology tools in online learning among pre-service teachers, (2) Results of developing online lessons for the Educational Technology Equipment Operation course, and (3) Results of implementing the developed online learning lessons on educational technology tools with pre-service teachers. The details are as follows:

5.1 Results of needs analysis of the use of educational technology tools in online learning among pre-service teachers

First, the tools that the pre-service teachers needed most for online learning were those required to complete assigned tasks or learning activities. The reason for this could be that appropriate tools greatly facilitate students to achieve the learning objectives set forth by the instructor [15].

Second, for online learning, the pre-service teachers needed tools and equipment, such as desktop computers, laptops, tablets, and smartphones, as they would help enhance the effectiveness of online learning for students [16,17]

Third, an effective learning management system was required for the pre-service teachers to follow the steps and instructions of all learning activities using the provided tools throughout the designed course swiftly. This can be compared to a management program on the Internet that serves as a center to support learning and connect learners to instructors and learning resources [18].

In addition, the pre-service teachers also needed instructional media and supporting tools as they would serve as a means of acquiring and spreading knowledge in different formats. While they help create mutual understanding between students and instructors, new technology attracts and engages learners [19].

Furthermore, communication tools are also needed among pre-service teachers as these tools could connect students to instructors. Using these tools, students can seek consultation and exchange ideas with instructors and peers, and the communication can be synchronous or asynchronous [20].

Finally, the pre-service teachers also found that learning activities were important because they are the main components that make online learning more enjoyable, engaging, and challenging [21].

5.2 Results of developing online lessons for the Educational Technology Equipment Operation course

First, the content seemed to be the most important part of the course for the pre-service teachers. This is because they will need the educational technology-related knowledge and skills from this course during their teaching practicum.

Second, the researcher designed online lessons based on the needs analysis results in the first phase to solve the problems or difficulties that students might experience. By doing so, issues are identified early and successfully solved before lessons are

delivered [22]. It is essential that the lessons are designed according to the learning objectives in terms of knowledge, skills, and attitude. In addition, all online activities should require the use of digital tools to complete so that students get to experience and learn how to use those tools.

Third, instructional media and supporting tools were created based on the video-based learning concept; therefore, instructional videos were the main component of this online course. The developed course included newly created videos, on-demand videos, live streaming, and video conferences. It is believed that video-based learning could promote learners' creative problem-solving skills [23], and videos are the most effective and common tools for online learning and teaching [24]. Moreover, effective tools, such as H5P (HTML-5 package), could create interactions between the content and learners, resulting in more meaningful and active learning [25], and interactive videos can help students improve their critical thinking skills [26].

Next, for assessment and evaluation, the researcher tried to make use of a variety of assessment and evaluation techniques, namely (1) Assessment for learning in which instructors provided feedback and suggestions in the form of messages, images, and videos, and classmates expressed opinions via a learning management system or other tools to improve the student's learning process [27], (2) Assessment as learning in which instructors designed activities that allowed students to review their existing knowledge and assess new knowledge using pre-tests, games, or online tests, at designated times [28], and (3) Assessment of learning in which students were able to check their assignment submission, participation, and suggestions at the end of the learning process [29].

Finally, as for screen design, the researcher used images and graphics related to the content to attract students' attention and promote their learning, which was more effective than texts alone [30]. A linear structure was used to arrange the contents so that students learn them through instructional media and supplements in order. Once students completed all the lessons, they would finally create their knowledge by conveying their experiences, perceptions, and observations from the course [31].

5.3 Results of implementing the developed online learning lessons on educational technology tools with pre-service teachers

First, the average score on the post-test was statistically significantly higher than that of the pre-test at the .05 level. This was possibly because the lessons were designed to create interactions between students and contents, students and instructors, and students and their peers while learning.

Second, the developed online course consisted of 10 topics and took 18 weeks to complete in the LMS+. The course had various activities, lectures, discussions, projects, and simulations. In online learning environments, learners' autonomous learning ability can facilitate them to learn autonomously and creatively with positive attitudes to improve their learning performance continuously [32].

Third, the researcher used the ADDIE model to design and develop the online learning lessons, which consists of 5 distinctive phases: Analysis, Design, Development, Implementation, and Evaluation [33]. The details were as follows: **Step 1 Analysis (A)** - The researcher conducted a needs analysis of students concerning

learning and teaching management, a content analysis to identify workload and instructional media, a learner analysis to design instructional media and teaching methods, an analysis of instructors to assess their expertise in teaching, and an analysis of teaching methods to identify appropriate methods of instruction. **Step 2 Design (D)** - The researcher used the analysis results to design the online learning lessons, which included teaching methods, activities, instructional media, learning management system, instructional tools, and assessment and evaluation. The online lessons were designed using the flipped classroom and video-based learning concepts. **Step 3 Development (D)** - The researcher created the online lessons following the design established in the previous step. **Step 4 Implement (I)** - The researcher conducted a trial session with 122 undergraduate students who enrolled in the Educational Technology Equipment Operation course at the School of Education during the third semester of the academic year 2020. The course was delivered via the LMS+. **Step 5 Evaluation (E)** - The researcher assessed the learning achievement of the students who completed the course and evaluated the developed online learning lessons from the students' opinions concerning different components. The results were used to improve the online lessons that will be used in the future.

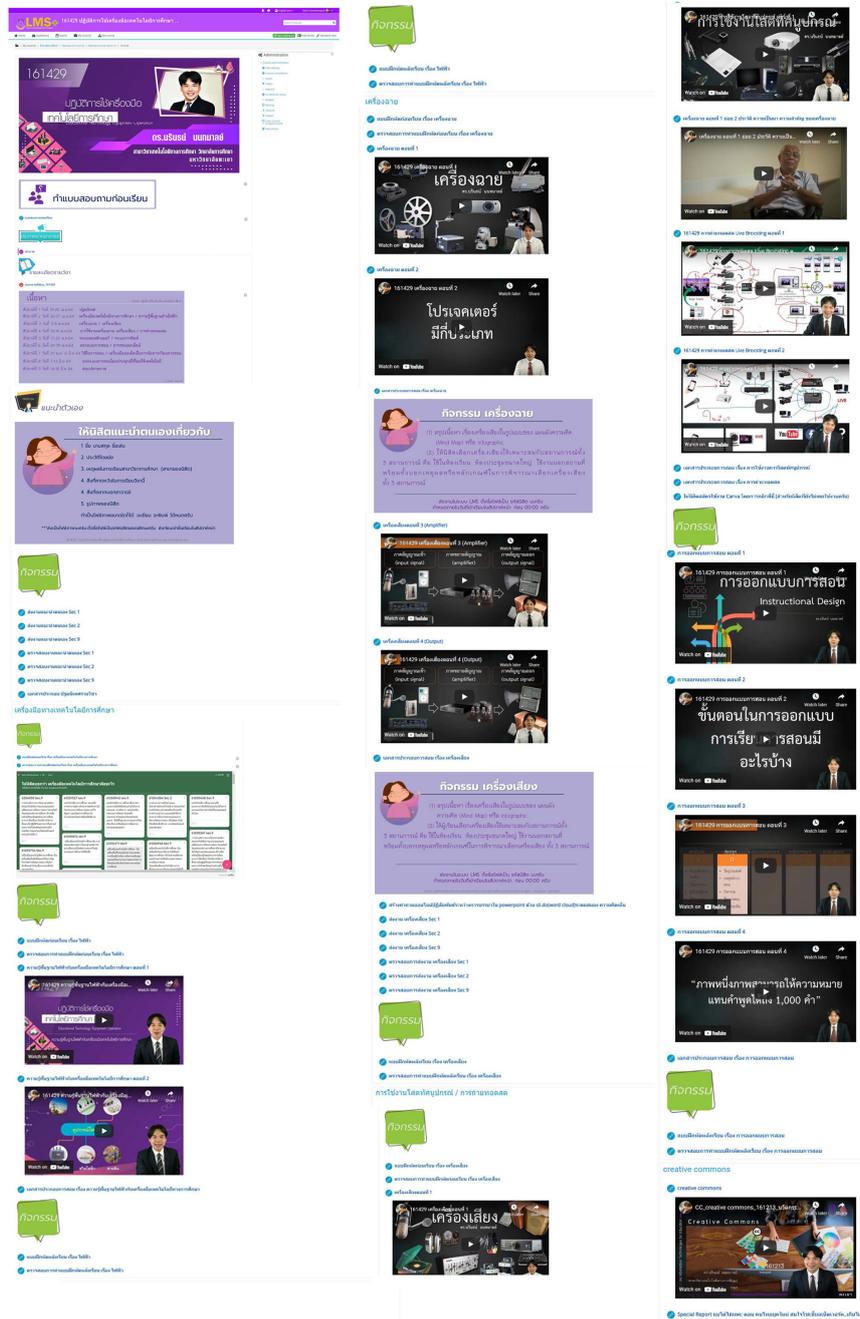


Fig. 1. Examples of online learning lessons in the Educational Technology Equipment Operation course for pre-service teachers

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