

Development of the Multimedia Modules for Interactive Online Learning to Enhance Understanding of Principles of Graphic Design on Packaging

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Abstract

Currently, the packaging industry is experiencing a shortage of graphic designers and the lack of interactive learning materials about graphic design. The purpose was to design motivational videos and audio in 7 modules to enhance understanding of graphic design using Adobe Illustrator. Each video clip for few minutes duration was produced with Adobe Premiere Pro and uploaded to the Google Classroom platform to be accessed by QR code scanning. The qualities of the multimedia were evaluated by three content experts and three media experts using a 5-point rating score. The learning effectiveness was observed using a specific focus group of 30 undergraduate students in the Printing and Packaging Technology program at KMUTT. The pre-tests and post-tests for each module were created with Google Forms using ten optimal multiple-choice questions in a module with IOC and difficulty level analysis. The qualities of the content and the media were rated as good with the mean score of 4.01 and 4.37, respectively. The learning efficiency, determined from the total post-test scores (E1) to the mean score of the final exercise (E2), was 84.2/88.14, which was higher than the expected criteria. The mean of post-test score was 48.24% increasing from the pre-test score which was significantly difference at the 0.05 level. Learners' satisfaction with the content was high ($\bar{x}=4.47$), and satisfaction with the multimedia was the highest ($\bar{x}=4.54$). The results suggested that this multimedia modules could be effectively applied to improve understanding of graphic design on packaging using Adobe Illustrator.

Keywords: Multimedia Modules, Interactive Online Learning, Graphic Design, Packaging

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Introduction

Due to the COVID-19 situation, there have been changes in lifestyles, leading to a “New Normal” where people interact less closely. As a result, many have sought to start their own businesses to increase income, which requires the use of packaging for product wrapping and safety. Packaging also helps maintain product quality and simplify transportation, aligning with the creative design for motivation. However, the packaging industry is experiencing a shortage of graphic designers and a lack of interactive learning materials about graphic design.

As technology advances and Internet accessibility improves globally, more students and educators are embracing digital platforms for learning and teaching. This shift has also been further accelerated by the COVID-19 pandemic, which forced educational institutions worldwide to adapt to remote learning models rapidly. With the rise in online learning, educational media must also adapt to become a valuable tool in modern education, offering flexibility and variety to meet the needs of learners. The computer, tablet, or mobile phones can easily access resources for everyone’s self-learning anywhere and anytime by connecting via the Internet.

In the meantime, micro-credentials: short, module or focused online courses leading to skill development (Upskill/Reskill) are becoming increasingly popular for many occupations. Modular learning is a teaching and learning approach that breaks down a course or curriculum into smaller ones. The self-contained modules can incorporate interactive elements such as quizzes and multimedia resources to enhance engagement and retention. Adobe Illustrator is the most popular program for graphic art creation such as logos, illustrations, graphics, line, etc. This work aimed to design motivational multimedia containing videos and audio in 7 modules to enhance understanding of graphic design with Adobe Illustrator on the folding box packaging.

Methodology

The interactive online learning entitled “Principles of Graphic Design with Adobe Illustrator on Folding Box Packaging” of 7 modules with each video clip for 2-3 minutes duration was produced with Adobe Premiere Pro and uploaded to the Google Classroom platform to be accessed by QR code scanning. The Google Classroom is a free web-based learning platform developed by Google, where teachers can run a class online, create curriculums, and share assignments with students by logging in with a Gmail address to access the Google Classroom.

The quiz for pre-tests and post-tests of each module was created with Google Forms using ten optimal multiple-choice questions for a module with IOC and difficulty level analysis as (1):

$$\text{Difficulty Index } (P) = R/T \quad (1)$$

(Where R is the number of correct responses,
and T is the total number of responses in the sample group)

The appropriate difficulty is 0.20-0.80 because the exams that were too difficult (<0.20) or too easy (>0.80) were unable to classify the learning outcome.

The multimedia qualities were evaluated by three content experts and three media experts with work experience related to design and teaching media for not less than 2 years, selected by purposive sampling using a 5-point rating score. The learning effectiveness was observed using a specific focus group of 30 undergraduate students in the Department of Printing and Packaging Technology at King Mongkut's University of Technology Thonburi. The sample group consisted of the second and the third year students of a 4-year program in the academic year 2023, selected by convenience. The samples had to take a pre-test before self-learning each module and then a post-test.

After completing seven modules, the learners took a final test and questionnaire to evaluate their satisfaction using a 5-point rating score, as shown in Table 1. The learning efficiency was determined from the total post-test scores of each module as the efficiency of the process during class (E1) to the average score of the final exercise as the efficiency of outcome after all classes (E2), which was set E1/E2 at 80/80.

Table 1: The Criteria of the 5-Point Rating Score for Evaluation

Scale	Scale Interval	Opinion for Quality	Description for Satisfaction
5	4.50-5.00	Excellent	Very Satisfied
4	3.50-4.49	Good	Satisfied
3	2.50-3.49	Average	Neutral
2	1.50-2.49	Poor	Dissatisfied
1	1.00-1.49	Very Poor	Very Dissatisfied

Results and Discussion

The learners can use computers, notebooks, mobile phones, tablets, or iPads to access the Google Classroom which can be downloaded for either Android or IOS anywhere that Internet availability, as Fig. 1 (a). In this Google Classroom, there are seven codes to enter each lesson module or scan the QR Codes of each lesson, as Fig. 1 (b). The topic, learning objective, and video clip duration of each lesson are shown in Table 2.

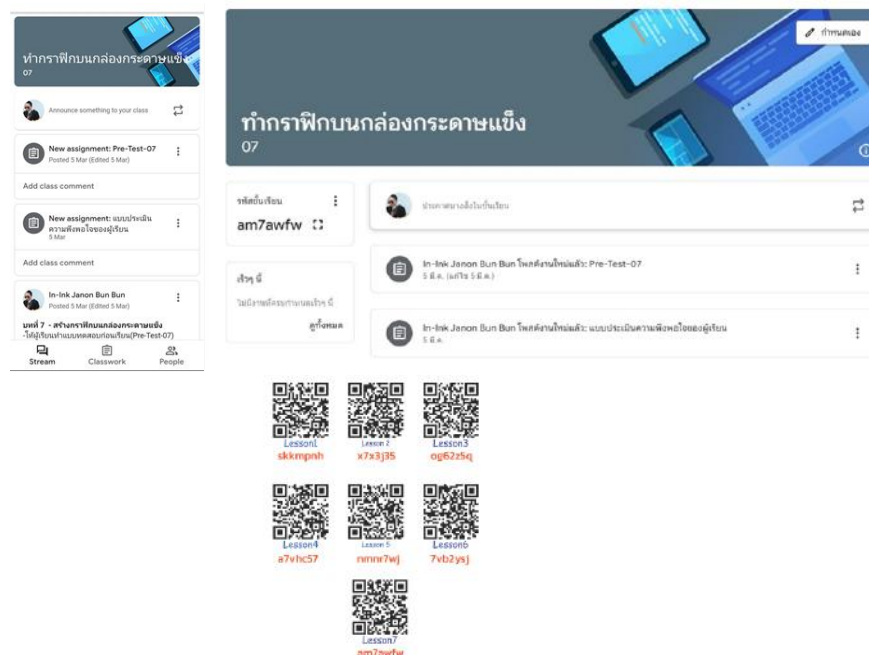


Figure 1: Displaying in a Google Classroom on Electronic Devices (a) and QR Codes for Access 7 Lesson Modules

Table 2: Lesson Modules of the Interactive Online Learning

Module	Topic	Learning Objective	Period (min)
1	Introduction to Basic Principles of Art	To improve the basics of art for learners.	02:07
2	Objectives of Packaging Design	To provide learners with an awareness of basic packaging design objectives.	01:57
3	Basic Application of Adobe Illustrator	To make learners understand the essential tools of Adobe Illustrator.	22:43
4	Additional Techniques for Adobe Illustrator	To support learners applying additional techniques for Adobe Illustrator.	09:54
5	Recommendation of resources for workpiece preparation	To guide learners aware of the source of additional resources for creating products.	08:21
6	Layout and Die Line for Folding Box Structure Design	To enhance learners building the folding box themselves.	09:11
7	Graphic Design and Creation on Folding Box	To enhance learners creating the graphics on the folding boxes.	08:54

The multimedia learning material of each module includes graphics, pictures, video, and audio to provide knowledge about the graphic design program Adobe Illustrator. They were produced using the Adobe Premiere Pro and uploaded in the Google Classroom platform. The examples of pictures captured from the multimedia are shown in Fig. 2.

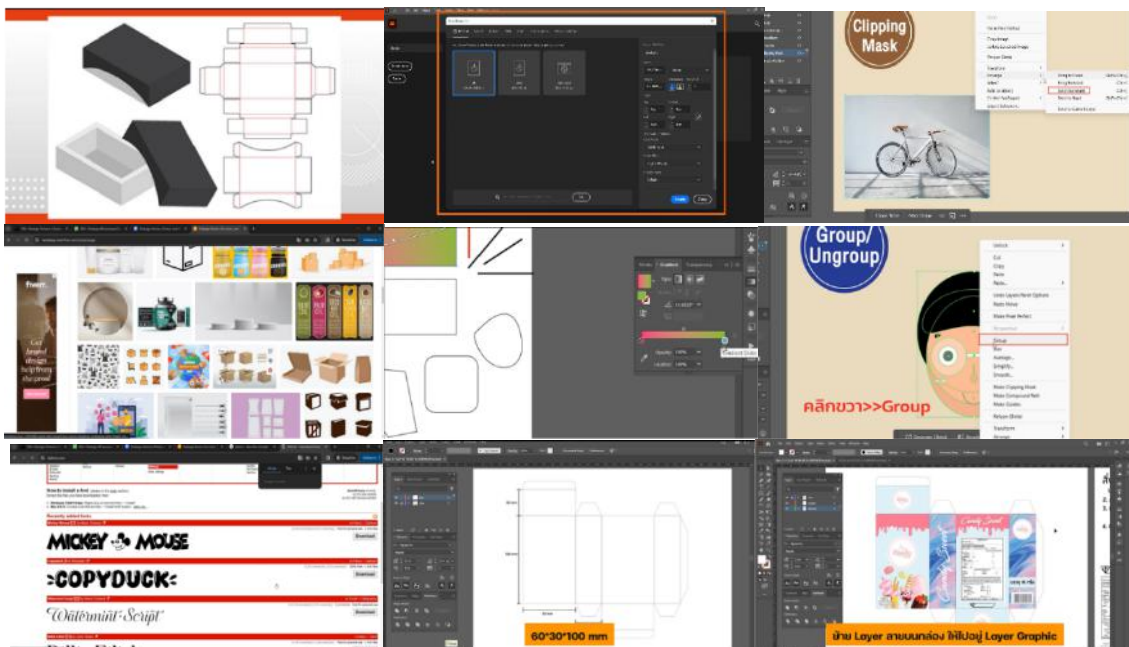


Figure 2: Examples of Picture Captured From the Created Multimedia

For the evaluation by 3 content experts and 3 media experts, the qualities of the content were rated as good ($\bar{x}=4.01$) from 10 evaluation topics and the qualities of the media were rated as good ($\bar{x}=4.37$) from 10 evaluation topics, as shown in Tables 3 and 4.

Table 3: The Quality Evaluation of the Content of the Interactive Online Learning

Item	Evaluation Topic	Mean	SD	Definition
1	Appropriateness of the content to the learning objectives	4.0	1.0	Good
2	Accuracy of content	4.3	1.2	Good
3	Appropriateness in arranging content	4.3	0.6	Good
4	Modernity of content	3.7	0.6	Average
5	Categorization of content	4.3	0.6	Good
6	Appropriateness of the amount of content	3.3	0.6	Average
7	Appropriateness of the sentences used in the content	4.0	1.0	Good
8	Content suitable for the target group	3.7	0.6	Average
9	Content completeness	3.7	0.6	Average
10	Suitability of illustrations and graphics with content	4.8	0.6	Excellent
Total mean score		4.01	0.74	Good

Table 4: The Quality Evaluation on the Multimedia of the Interactive Online Learning

Item	Evaluation Topic	Mean	SD	Definition
1	Appropriateness of the use of background colors	4.3	0.6	Good
2	Appropriateness of the font style and size	4.7	0.6	Excellent
3	Appropriateness of the font color	4.3	0.6	Good
4	Suitability of elements on the screen	4.7	0.6	Excellent
5	Appropriateness of the sound effects	4.0	1	Good
6	Consistency of illustrations with content	4.7	0.6	Excellent
7	Sharpness of images and clarity of sound in video	4.3	0.6	Good
8	Solution of scores summarize in exercises	4.0	1	Good
9	Interesting and engaging learning of lesson	4.0	0	Good
10	Suitability for dissemination of lessons learned	4.7	0.6	Excellent
Total mean score		4.37	0.62	Good

There were some topics should be improved for the content such as modernity, amount, suitable for the target group and completeness. For modernity, many updated programs should be recommended. The content amount of each module should be of similar length. The content should be adjusted to be appropriate for adult learners and added design examples to make the content more complete. For the media, the experts suggested that interactive online learning should be made into a website, including YouTube or a Learning Management System (LMS), for easy access and user data collection.

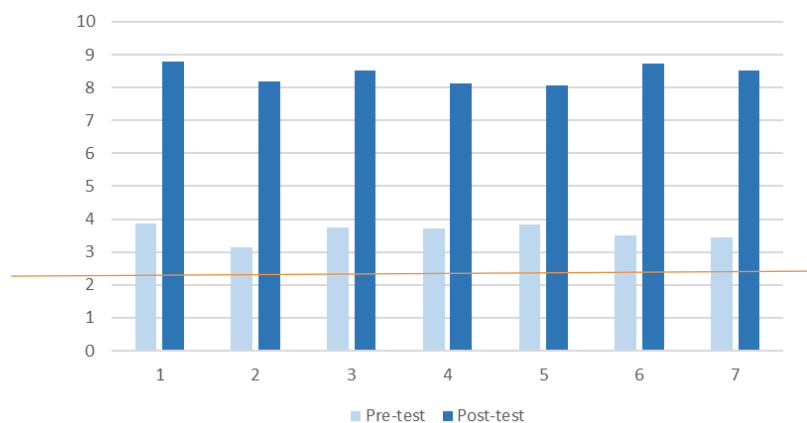


Figure 3: Average Scores of Pre-test and Post-test for Seven Modules

To investigate the learning effectiveness of the learners, the average scores of pre-test were compared to the average scores of post-test for seven modules, as shown in Fig. 3. The result showed that each module's content was consistent with each module's questions. The learning materials were so good that the learners gained a greater understanding. The average score of the sample group before learning the lesson was 3.60 points, while the average score after learning the lesson was 8.42 points, meaning that the average score increased by 48.24%. Comparative result of learning achievement was analyzed using one-way ANOVA with the Tukey method. It was found that the average score after learning all seven modules was higher than the average score before learning, with a statistically significant at 0.05 level.

The average score in the percentage of the final test, which was 10 appropriate questions by the sample of respondents after learning all 7 modules is shown in Table 5. The learning efficiency, determined from the total average post-test scores as the efficiency of the process during class (E1) to the average score of the final exercise as the efficiency of outcome after all class (E2), was 84.2/88.14, which was higher than the expected criteria of 80/80.

Table 5: Scores of the Final Test After Learning All 7 Modules

Question No.	1	2	3	4	5	6	7	8	9	10	Average
Point (%)	100	65.6	75	100	81.3	93.8	87.5	87.5	93.8	96.9	88.14

For the satisfaction of the sample group of 30 learners with the learning media, the results are shown in Tables 6 and 7. It was found that the learners were satisfied with the content ($\bar{x}=4.47$), and very satisfied with the multimedia ($\bar{x}=4.54$).

Table 6: The Satisfaction Level of the Sample Group with the Content of the Interactive Online Learning

Item	Evaluation Topic	Mean	SD	Definition
1	Appropriateness of the content to the learning objectives	4.55	0.51	Very Satisfied
2	Accuracy of content	4.5	0.51	Very Satisfied
3	Appropriateness in arranging content	4.5	0.61	Very Satisfied
4	Modernity of content	4.45	0.51	Satisfied
5	Categorization of content	4.5	0.51	Very Satisfied
6	Appropriateness of the amount of content	4.5	0.51	Very Satisfied
7	Appropriateness of the sentences used in the content	4.4	0.6	Satisfied
8	Content suitable for the target group	4.5	0.51	Very Satisfied
9	Content completeness	4.25	0.64	Satisfied
10	Suitability of illustrations and graphics with the content	4.5	0.61	Very Satisfied
Total mean score		4.47	0.74	Satisfied

The mean score for satisfaction of sound effects was the lowest (4.15) which might be caused by the subtitles where some words were not pronounced clearly. Some learner samples complained that there were too many exercises before and after class of each module for seven lessons which may cause learners to waste time for their self-learning.

Table 7: The Satisfaction Level of the Sample Group With the Multimedia of the Interactive Online Learning

Item	Evaluation Topic	Mean	SD	Definition
1	Appropriateness of the use of background colors	4.8	0.41	Very Satisfied
2	Appropriateness of the font style and size	4.75	0.44	Very Satisfied
3	Appropriateness of the font color	4.7	0.47	Very Satisfied
4	Suitability of elements on the screen	4.6	0.5	Very Satisfied
5	Appropriateness of the sound effects	4.15	0.67	Satisfied
6	Consistency of illustrations with content	4.4	0.5	Satisfied
7	Sharpness of images and clarity of sound in video	4.4	0.6	Satisfied
8	Solution of scores summarized in exercises	4.6	0.6	Very Satisfied
9	Interesting and engaging learning of the lesson	4.4	0.5	Satisfied
10	Suitability for dissemination of lessons learned	4.6	0.5	Very Satisfied
Total mean score		4.54	0.52	Very Satisfied

Conclusion

The online learning multimedia contained graphics, photos, videos, and audio to provide knowledge about using the Adobe Illustrator program. There were seven modules created by Adobe Premiere Pro through the Google Classroom platform accessed with seven unique codes or QR codes. The content qualities rated as good with a mean score of 4.01 and the media qualities also rated good with a mean score of 4.37.

The experiment was conducted with a sample of 30 undergraduate students of the Department of Printing and Packaging Technology in the academic Year 2023 at King Mongkut's University of Technology Thonburi, Thailand. There were a pre-test and post-test for each module with ten multiple choice questions, created in Google Forms.

The mean post-test score was 48.24% higher than the mean pre-test score, with a significant improvement at the 0.05 level. The learning efficiency, based on post-test (E1) and final exercise (E2) scores, was 84.2/88.14, exceeding the expected criteria (80/80).

The learners were satisfied with the content with a mean score of 4.47 and very satisfied with the multimedia with a mean score of 4.54. The study suggested that this multimedia modules could be effectively applied to improve understanding of graphic design on packaging using Adobe Illustrator program.

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