

A Study on the Effectiveness of Multimedia Instructional Materials for Adult Learners

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ABSTRACT

Online educational and e-learning atmosphere is rapidly being exploited by adult learners, and therefore ought to be created centred on their desires. Multimedia content founded on e-learning generally is considered effective in the education process. This approach helps to construct a scholar centered education where undergraduates or students can study at their own pace, anywhere and anytime. The researchers are undertaken with the aid of multimedia instructional materials that are specifically designed and developed for the adult learners. It has taken into consideration Gagne's Learning Theory with the perspective and assumptions of Knowles' andragogy. The multimedia subject is believed to be an efficient learning aid that helps adult learners in their studies towards improving their performance. The controlled group is given the existing e-content of a learning topic although the investigational party utilizes the purposely established multimedia content of the same learning topic. The analysis of the pre-test and post-test serve as an indication that the multimedia content that was developed proved to be a helpful learning material for the adult learners. Data was also collected from the respondents on the content, usefulness, effectiveness and interactivity of the multimedia content.

KEYWORDS: Adult Learner, Theory of Learning, Interactive Multimedia Application, E-Content.

INTRODUCTION

The speedy advancement in knowledge, skills, ICT and the demand for lasting studying as well as the evolution of non-traditional students have boosted the use of the computer as a means of instructional conveyance for learning. Nowadays, e-learning has been widely used in the higher education tier in Malaysia as a learning tool for adult learners. Adult learners are typically ages 25 and older and learn differently from children and young student as they have far more complex background in terms of accumulated life experience and responsibilities [6, 18]. An adult learner usually pursues studies on a part-time basis, taking and seeking alternate delivery systems, in a specific virtual studying which emancipates them from encounters of time based classroom activity [3].

This article will discuss about the effectiveness of the multimedia contents for adult learners. The multimedia content was designed and developed using both the theory of learning by Robert Gagne and the theory of adult learning i.e. andragogy by Malcolm Knowles. Nowadays, many adult novices frequently resume to school to increase skills to remain competitive in the workplace, to increase their employability, organize them for a profession alteration and enhance their earning supremacy. Nevertheless, adult learner has faced several challenges which are profession, household and monetary concerns, fixed schedule and restricted time, strict funds and shortage of money, deficient academic preparedness and self-assurance and also lack of knowledge and services [3]. In order to help adult learners to reduce the challenges and burden in learning, several theories and models had been developed to help the adult learners. Therefore, theory of andragogy, the art and science of helping adults learn introduced by Malcolm S. Knowles' is one of the important theories that have been adopted by scholars [10].

The effectiveness of the multimedia contents will be tested with a selected group of adult learners/student. The students will be given a set of pre-test questions before using a specifically developed multimedia contents. Then, the students will be given a post-test questions after using the multimedia contents to test the effectiveness of the developed multimedia development and the results of the test then will be analyzed.

PROBLEM STATEMENT

E-learning environment gives a more valuable in learning and teaching atmosphere. The beginners' attainment in studying is favoured and can be magnified throughout the use of computers and the Internet in the cyber environment. People can review, comprehend new resources, measure skill, endeavour the assignment, increase their intellectual and strengthen their proficiencies [12, 4].

Apart from the the skills in ICT as an accelerator for learning, the fundamental theories of adult learning and the instructional design aspect should also be pondered and put into the balance in creating comparison and finest online sources for adult beginners. This is important because the learning activity that occurs in grown person differs from children. For example, if the research provides the similar studying tools for both sets of learners, it might be costly and time proficient but might head to some undesired consequences [4].

The dearth of interactive multimedia resources created for adult learner turn into the important keys of this study in the examine of :

- The planning of appropriate educational resources in accordance to the course with adult learners in mind.
- A good and organized transfer of knowledge approach.
- The technique to please the smaller attracted adult learners demand in learning.
- The approach for acquirement practice that can be aided and improved.

LITERATURE REVIEW

Adult Learner

Adult learners mostly are educate in traditional and inactive classroom. E-learning atmospheres are likewise new to the teachers or trainers, who need to study the latest methods for teaching using this new online learning environment. Furthermore, teachers or trainers and the learner both must get use on how to practice in the latest learning environment. In addition, trainers, designers and other speciaiaists working in the design of online environments for adult must recognise the theory in adult learning especially in terms of its affiliation with online learning [10].

In addition, adults learn in a different way than that of children and young student as they (adult learners) have far more complex backgrounds in terms of experience and responsibilities. The characteristics of adult learners as mentioned by [18, 14, 17] can be categorized as follows:

- Independent/self-directed in what he/she learn.
- Has considerable experience to draw upon.
- Interested in topics that relate to the developmental stage of his/her life.
- Interested in information and ideas that can solve problems that they are presently faced with.
- Interested in information that can be immediately applied.
- Motivated person.

Multimedia Learning Theory

Multimedia is defined as a combination of a text, art, sound, animation and video delivered to the user by the computer or other electronic devices [19]. Nowadays, multimedia has been used widely as a tool in education field which is being used around the world including Malaysia. Multimedia learning theory is a combination of text, animation, video, audio and images. Learning can be measured by a test of retention. For example, remembering the presented information transfer and being able to use information to solve new problems or apply to their working environment. Multimedia learning focused on the transfer of words and pictures that can help to promote user understanding [16].

There are several multimedia learning theories from other researchers that can be used as a reference in order to develop effective and attractive educational multimedia contents. The objective of educational multimedia learning is to assist learning outcomes for the defined users [9]. The theory of multimedia is based on three frameworks which are Dual Coding Theory, Working Memory Theory and Theory of Cognitive Load [15].

Learning Theory in E-Learning

Learning is an activity or a process of gaining knowledge or skills by studying, practicing, being taught or experiencing something [2]. Although there are many different approaches to learning, it can be categorized into three basic types of learning theory which are behaviorist, cognitive and constructivist. The behaviorist learning theory assumes that a learner is passive and responding to environmental stimuli. All behaviors can be explained without the need to consider internal mental states [8].

Cognitive learning theory usually argues that the 'black box' of the mind should be opened and understood. The learner is viewed as an information processor like a computer [1]. One of the cognitive learning theories is Gagne's learning theory. Integrating this learning theory into the multimedia-mediated contents in the student-centered learning environment can improve students' learning. It can be a platform to provide or enable more individualizing learning environment for a larger group of learners based on the research that had been conducted [11].

In addition, by using Gagne's nine events of instruction can help to develop more effective lesson plan and learning objectives [7, 11]. Gagne outlines the following nine instructional events and corresponding cognitive processes:

- i. Reception
- ii. Expectancy
- iii. Retrieval
- iv. Selective perception
- v. Semantic encoding
- vi. Responding
- vii. Reinforcement
- viii. Assessing performance (retrieval).
- ix. Enhancing retention and transfer (generalization).

According to Knowles, andragogy (Greek: “man leading”) should be distinguished from the more commonly used pedagogy (Greek: “child learning”) [3]. The practice of andragogy, unlike pedagogy puts the focus on the learner which is an adult and not on the teacher. In addition, adults are assumed to prefer self-directed learning, bringing experience to learning activities, being responsible for their decision on education, exhibit an orientation to learning that is task or problem-centered and exhibit a relatively high degree of internal motivation [5]. Furthermore, the use of technology in adult learning has been given a new opportunity to provide a more interesting learning experience. However, younger students found to have more skills and interests in the use of information technology (IT) in the teaching and learning (T&L) when compared with adult learners [16].

Constructivist learning theory believes that learning is an active and constructive process. The learner is an information constructor. People actively construct or create their own subjective representations of objective reality. New information is linked to prior knowledge, thus mental representations are subjective [1].

The Development of Multimedia Contents Using Gagne and Knowles Theory

The theory of Gagne Learning Model (1985) and andragogy by Malcolm Knowles (1979) are used as the basis for the research phase where it is proven to be a major contribution on the students’ learning process. From learning theory research, a multimedia developer should be able to integrate the concept of teaching and learning with multimedia applications. It is important to have such knowledge in order to develop an effective e-materials to be conveyed to students. Teaching theory of Robert Gagne is considered as a major contributor to the design approach of teaching and training. One of his most important contributions is the theory of “events of instruction” that can be applied to produce an effective teaching presentation [13].

Getting Attention

Before starting a lesson, the instructor need to attract the attention of the adult learner by using sound, music, videos, headlines or asking questions. For example, by using graphics, animation, audio or video. With a combination of two or more multimedia elements, it will help to gain the attention of the adult learner. Figure 1 shows the example of using video to gain the attention of adult learner to before starting a lesson.



Figure 1: Insert video to gain attention

Inform Learner of the Objectives

Adult learner needs to be informed about the objectives, purpose of the study and expected outcomes of the learning. This will provide the learner with what the study is all about during the time of learning. For example in Figure 2, the e-content will show the objectives of the study for the lesson.



Figure 2: The objectives of the study

Recall Prior Learning

Before starting the learning, stimulate the adult learner’s memory by relating a new information that has been learned before, recalls the concept, content and knowledge on what the adult learner has learned before.

Presenting the Stimulus

Information in the normal form can be delivered more effectively and stimulate adult learners by breaking information with important points. Furthermore, presents the contents through graphic, animation or sequence of the corresponding text. For example in Figure 3, the steps of animation process are explained by using the sequence of the corresponding steps to help the adult learner remember the steps easily.

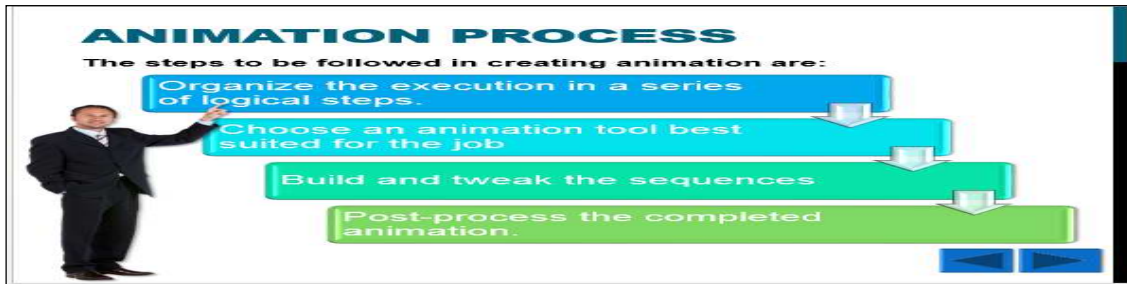


Figure 3: Presenting the stimulus

Providing Learner Guidance

The adult learner need to be facilitate the process of understanding by using learning guides. There are several ways to achieve this, for example by describing the process of semantics or phrases by using symbols, signs or formulas to facilitate learning. In addition, propose meaningful contents organization such as by using examples, analogy or graphic representation. For example in Figure 4, it uses a graphical representation to explain step by step of stop motion animation.

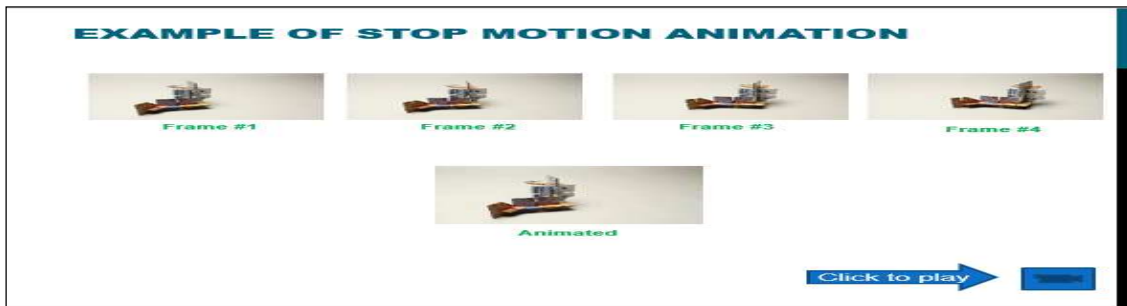


Figure 4: Step by step examples

Eliciting Performance

To measure the performance, adult learner should be given appropriate training or assessment or test that are according to their level of studies. The instructor needs to ask the student to give respond and do a lot of practice. For example, the multimedia contents provide assessment so that the student will increase their understanding after completed the study. In Figure 5 shows the example of an assessment that had been developed for the adult learner.



Figure 5: The assessment after the study

Providing Feedback

To improve student performance, the instructor should emphasize that testing and training during tutorial are not for formal scoring but as a reinforcement activity and the importance of giving specific feedback on student achievement.

Assessing Performance

In order to complete the teaching module, the following should be noted. Assessment is prepared without any extra activities or feedback. In addition, confirmation of skill level and certification is given after achieving a certain level of score or percent. For example, Figure 6 shows the assessing performance by using a quiz.

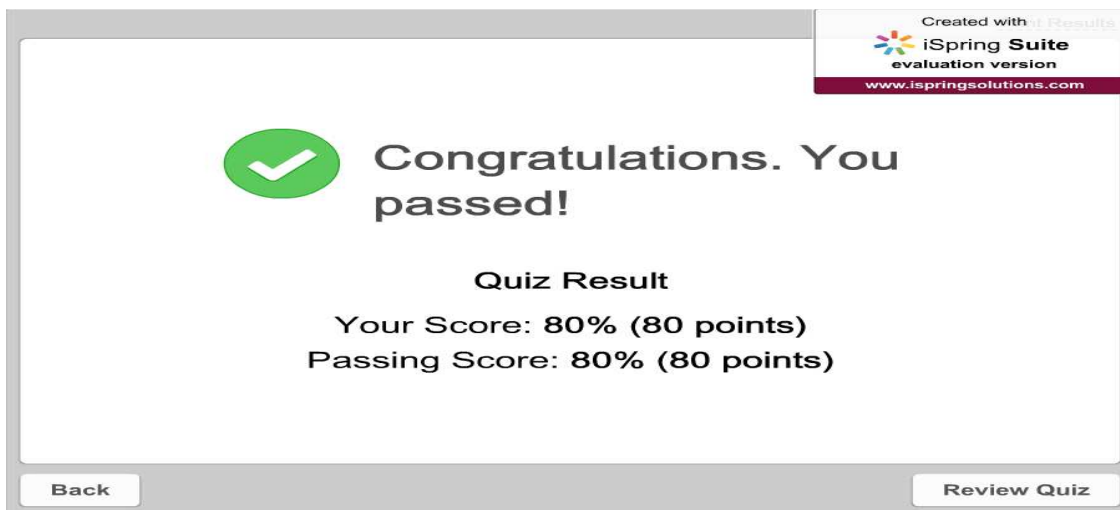


Figure 6: Assessing performance

Retention and Transfer

To stimulate memory and facilitate the transfer of information, firstly training modules must have a focused performance, accompanied by a design and media that stimulate memory and transferring information. In addition, the concept of learning is repetition in an attempt to help the process of memory stimulation. Furthermore, developed teaching aids in the form of electronic or online materials and reference materials. "Template" and "wizard" in the application are other methods that can improve performance [13].

DATA ANALYSIS

The result of data analysis is based on the testing that was conducted with two groups of adult learners ($n = 50$). Both the controlled group and the experimental group contain 25 students each. The controlled group is using the normal or existing digital lesson content as used in the class, while the experimental group is using the new multimedia content that was designed and developed specifically with the consideration of Gagne and Knowles theories.

Furthermore, to analyze the performance of the students, a pre-test and post-test method is utilized. The same questions for both tests are distributed to the students of both groups at an interval of one week. The results then are analyzed from the pre-test and post-test scores. In addition, the questionnaire also are being distributed to the experimental group to analyze the effectiveness of the multimedia content that is used.

Pre-Test and Post Test

Figure 7 shows the frequency chart marks for pre and post-test for both groups. Both groups are given the pre-test before starting the lesson and the student have to answer all the questions. The marks are analyzed from it, while the post-test will be given one week after the lesson has finished. The score differences of pre and post-test for both groups can be seen from Figure 7.

The highest mark for the test is 10 marks, while the lowest 0 marks. For control groups, there are 2 students who get lowest marks for pre-test which is 0 marks while 2 students get 9 marks for post-test questions. For experimental groups, there are 3 students who get the lowest marks for pre-test which is 1 marks while there are 10 students who managed to get 9 marks for post-test in the experimental group. The differences of marks in control groups are more less than the experimental groups because experimental groups has used the new multimedia contents instead the old one.

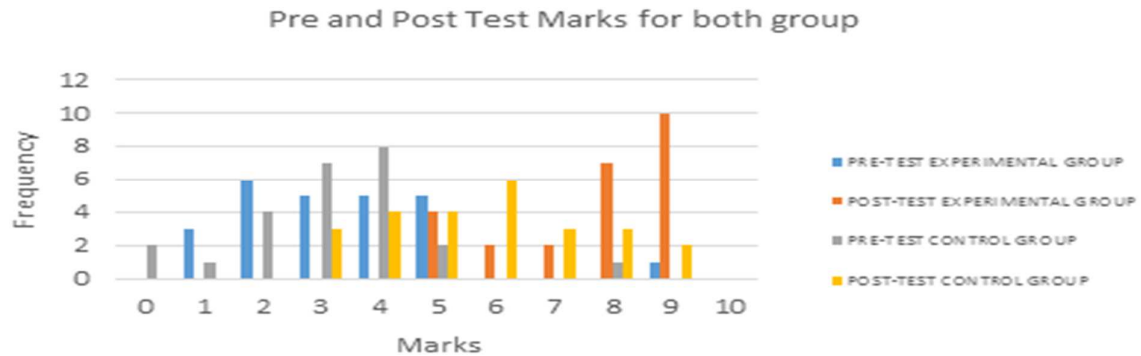


Figure 7: Chart for frequency marks of pre and post test

Questionnaire Analysis

The questionnaire is distributed to 25 students of e-PJJ in Graphic Design course from UiTM Kampus Puncak Alam. The questionnaire is given after they had used the multimedia instructional materials of developed e-content. The selected question is analyzed and are categorized into four categories which are contents, usefulness, effectiveness and multimedia elements in order to study about the effectiveness of the multimedia instructional materials for adult learner.

The Contents of E-Content Multimedia

In this section, the results will analyze about the multimedia instructional material contents of e-content multimedia that the student had used, whether it is suitable or not compare with the contents that they had already used before.

The Learning Objectives Are Stated Clearly

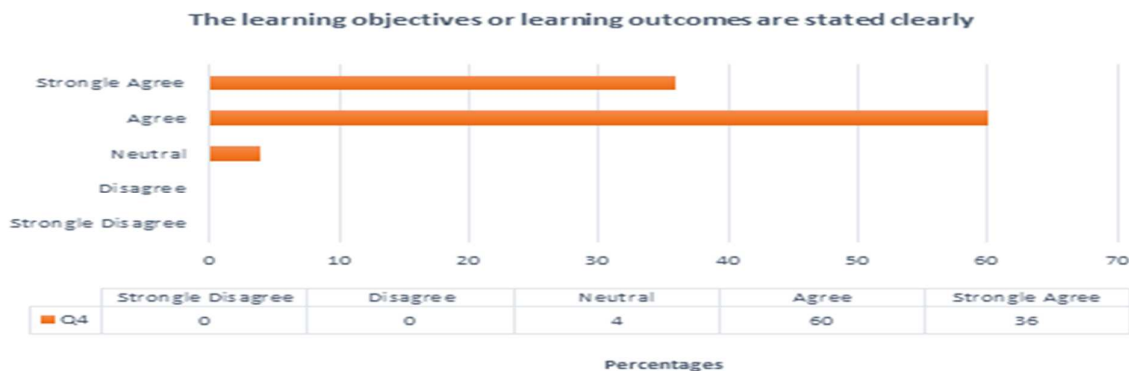


Figure 8: Question 4

Based on the Figure 8, 60% which is 15 students agree and 36% which is 9 students strongly agree that the multimedia e-content that are being used are clearly stated the learning objectives.

The Contents Help Me to Relate With My Previous Knowledge and Experience

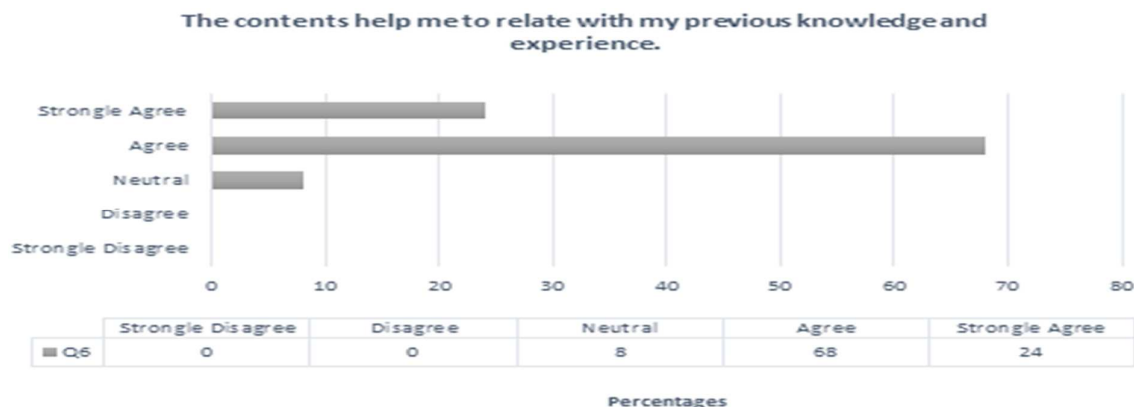


Figure 9: Question 6

Based on Figure 9, 68% which is 17 students and 24% which is 7 students from 25 students agree and strongly agree that the content can help the students to relate with their previous knowledge and experiences.

The Usefulness of E-Content Multimedia

In this section, the results will analyze about the usefulness of e-content multimedia instructional materials that the student had used whether it is useful for the students or not compare with the contents that they had already used before.

The Contents Help Me to Understand Better

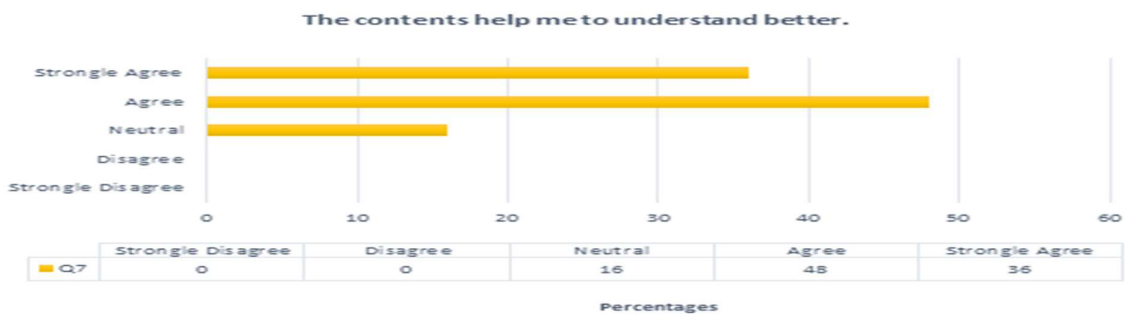


Figure 10: Question 7

Based on Figure 10, 48% which is 12 students and 36% which is 9 students from 25 students agree and strongly agree that the e-content can help them to understand better.

The Contents Are Arranged Properly and Clearly

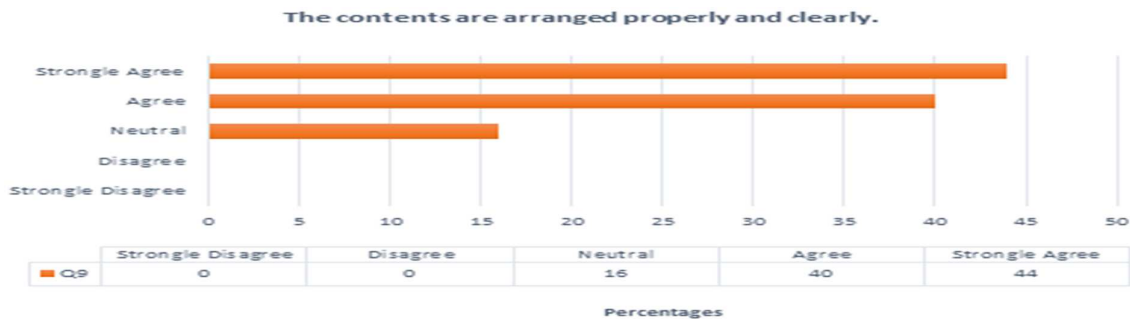


Figure 101: Question 9

Based on Figure 11, 40% which is 10 students and 44% which is 11 students from 25 students agree and strongly agree that the content of e-content are arranged properly and clearly.

The Effectiveness of E-Content Multimedia

In this section, the results will analyze about the effectiveness of the e-content multimedia instructional materials that the student had used whether it is suitable or not compare with the contents that they had already used before.

The Examples Given Makes I Understand the Contents Better

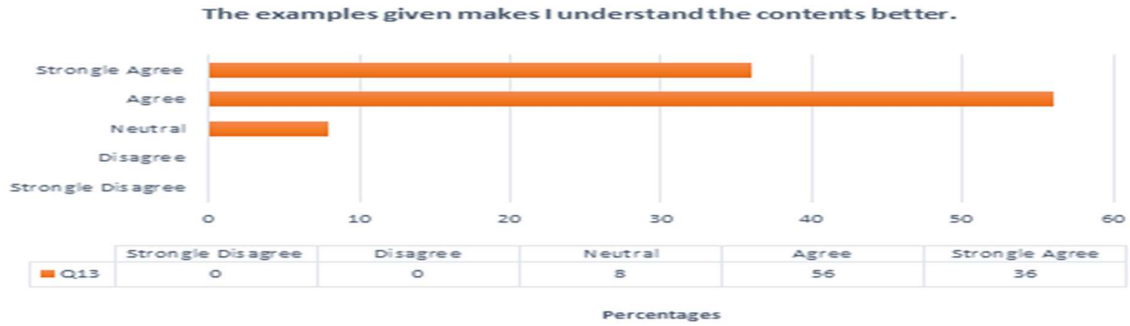


Figure 112: Question 13

Based on Figure 12, 56% which is 16 students and 36% which is 8 students from 25 students agree and strongly agree that the e-content multimedia instructional materials that they used to give the suitable examples and helps them understand better.

Exercise and Assessments Provided are Sufficient

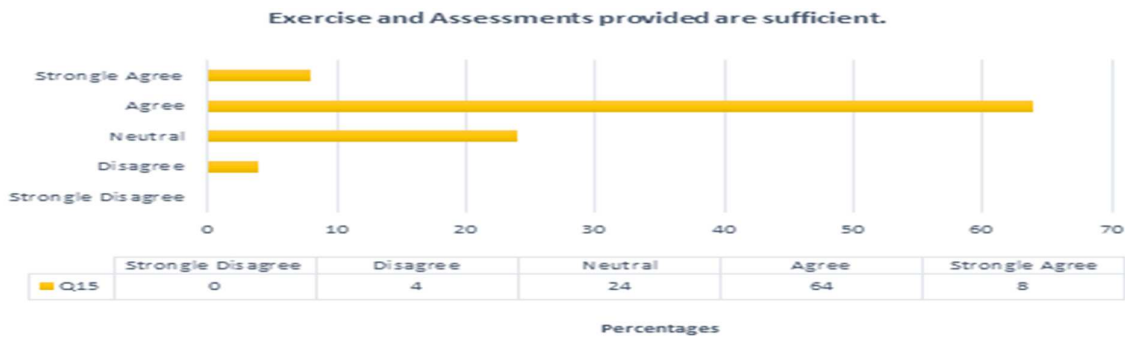


Figure 123: Question 15

Based on Figure 13, 64% which is 16 students and 8% which is 2 students from 25 students agree and strongly agree that the exercise and assessment that are provided in the e-content multimedia instructional materials are sufficient.

The Knowledge from the Contents Can Be Applied In the Workplace

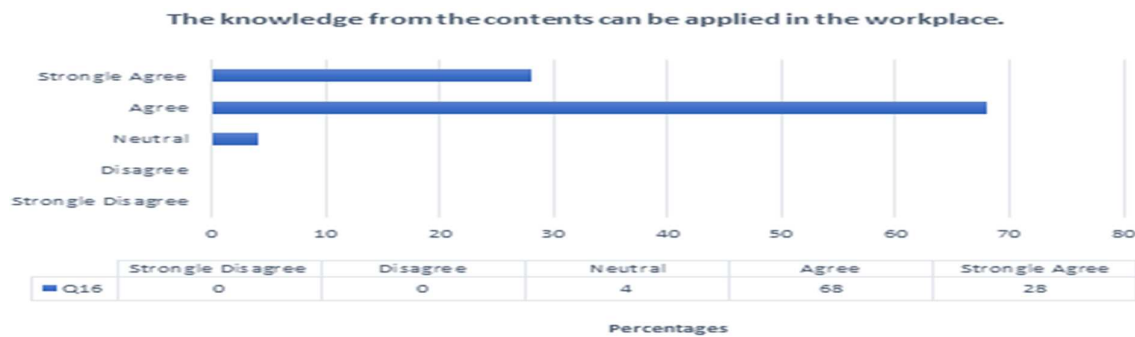


Figure 14: Question 16

Based on Figure 14, 68% which is 17 students and 28% which is 7 students from 25 students agree and strongly agree that the knowledge of e-content multimedia instructional materials can be applied in the workplace.

Multimedia Elements in Multimedia Instructional Materials

In this section, the results will analyze about the multimedia elements of the multimedia instructional materials that the student had used.

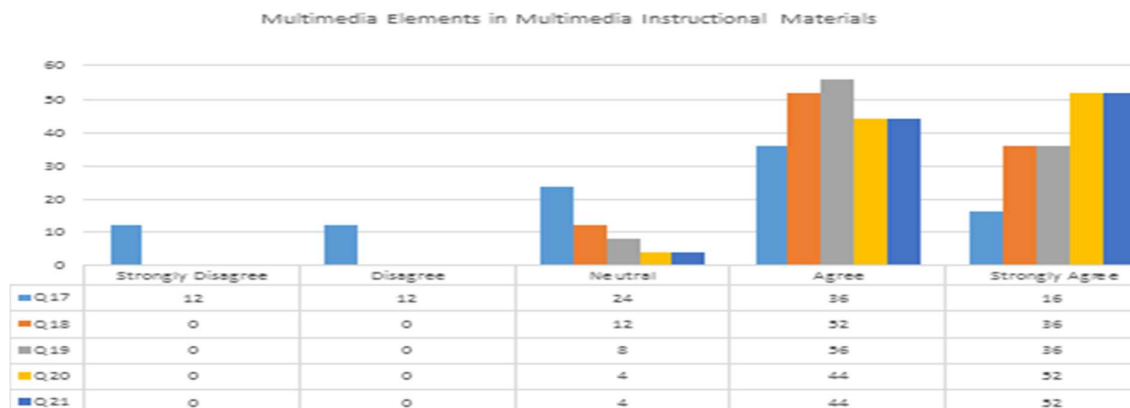


Figure 15: Multimedia elements questions

Based on Figure 15, most of the students agree that the multimedia elements in multimedia instructional materials that had been used can help in the study. Based on the chart, 36% (9 students), 52% (13 students), 56% (14 students) and 44% (11 students) of student agree that the multimedia elements such as text, audio, animation, video and graphics in multimedia instructional materials that had been used can help in the study.

CONCLUSION

From the analysis of the results, it is shown that the multimedia contents that are being developed using the combination of Gagne Learning Theory and Malcolm Knowles andragogy for the adult learner meets the requirements of the target users. However, there are many improvements that can be added to the multimedia instructional materials of e-content. Therefore, continuous improvement is needed in order to produce high quality products to meet the requirements of users.

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