USING LEARNING STYLES APPROACH IN MOODLE PLATFORM TO ENHANCE TEACHING AND LEARNING DESIGN

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Abstract

The report focused on using multimedia (Moodle) platform to enhance student’s motivation and individual differences. Teacher can use Moodle platform to check student’s learning styles such as auditory domain, visual domain or kinaesthetic domain (VAK approach). If the teaching and learning package matched with student’s learning styles, students can adopt the contents of materials easily. By Moodle platform the on-line assessment to get the instant feedback. The report is investigated the effect of knowing self-learning styles. Moreover, the report also provided how to build an effective multimedia platform by using ADDIE (Analysis, Design, Develop, Implement and Evaluation) model and Gagne’s nine instructional event model in an electrical engineering module. These models can help teachers to enhance teaching and learning design by using innovative multimedia technology. This report is integrated the multimedia technology with educational theory in order to provide effective learning environment to our new generations.

Keywords: VAK styles, Moodle, ADDIE module, Gagne’s instructional design, instant feedback

Introduction

Nowadays, most of my students use Hong Kong Diploma Secondary Education Examination (HKDSE) scores to study the engineering program in the vocational training institution. However, their academic backgrounds are quite differences. For example, some students have already studied physics and advanced mathematics, but some students studied history and language in secondary school. Student’s learning individual differences are very large and some student’s learning motivation are low due to lack of basic knowledge. Therefore, the report is pinpointed the efficiency of using learning styles approach and Gagne’s instructional teaching design (Mayer, R.E., 2001), (Gagne, R. M., Briggs, L. J., & Wager, W. W., 1992) in one technical engineering module in order to minimize student’s learning individual differences and increase their motivation.

Background and Pedagogy

The report focus on two groups of students who study in the Qualification Framework (QF) level 4 of higher diploma in electrical engineering course. One module “Control and Automation System (CAS)” is selected to use the new learning styles approach and Gagne’s instructional design. This module is selected to review because it is lower than benchmark marks under The Hong Kong Institution Engineers (HKIE) accreditation review. Moreover, if teachers use traditional lecturing method for teaching, most students feel boring in the single direction teaching and some of them cannot follow the teaching flow in the lesson. The CAS module is mainly to teach the LabVIEW software program technique and Programmable Logic Controller (PLC) logic program. This module consists of 5 numbers of laboratory workshops, 7 numbers of tutorial classes and 13 lecture classes. This module has total 52 contact hours. One chapter about “while loop and array program” of LabVIEW software is selected to use the new instructional design approach.

ADDIE (Analysis, Design, Develop, Implement and Evaluation) instruction system design model (顏春煌, 1996), (Richey, Klein & Tracey, 2011) is employed to review this chapter to enhance the teaching materials incorporated with the multimedia technology. For the Analysis stage, it is a process to define the learning outcome, the character of students, the needs of resources. For the Design stage, it is a process to design the teaching contents, classroom activities and assessment methods to meet the learning outcomes. For the Develop stage, it is a process to combine all teaching and learning activities based on the design blueprint. For the Implement stage, it is a process to act the teaching and learning activities in real situation. For the Evaluate stage, it is a process to evaluate the quality and effectiveness of the teaching and learning activities such as achievement of the learning outcomes, learning motivation.
Using ADDIE Methods

Analysis:
The objectives of using multi-media (google and Moodle platform) to let student to learn the LabVIEW software “While loop and array” easily. The objectives are:
Objective 1) As some students have low motivation and they don’t know their level of understanding, interactive multimedia teaching materials and online formative assessment can improve their motivation and achieve “assessment for learning” by attractive new cut animations and online instant feedback to each student (Broadfoot, P. M., Daugherty, R., Gardner, J., Harlen, W., James, M., & Stobart, G. 2002).
Objective 2) as different students have different learning styles and learning speed, students can learn the online teaching materials according to their learning styles and speed. It can minimize the learning individual differences.

Design:
The learner-centered approach is preferred to use in the multimedia learning design, which are consistent with the human mind works effective (Mayer, R.E., 2001). If the multimedia learning features can match student’s learning style, it can help learner’s information processing system effectively. Therefore, one group of students are required to do a learning style test in the initial stage in order to identify their learning style types. The learning styles are mainly consisted of Visual, Auditory, and Kinesthetic (VAK) learning style (Cassidy, C., & Kreitner, B. 2009). After they know their learning styles, students can use their domain style to choose learning materials (such as reading manual or watching video) to absorb new information more easy. Some VAK test (Victoria Chislett, 2005) shows as below:
1. When I operate new equipment I generally:
   a) read the instructions first
   b) listen to an explanation from someone who has used it before
   c) go ahead and have a go, I can figure it out as I use

2. When I need directions for travelling I usually:
   a) look at a map
   b) ask for spoken directions
   c) follow my nose and maybe use a compass

3. When I cook a new dish, I like to:
   a) follow a written recipe
   b) call a friend for an explanation
   c) follow my instincts, testing as I cook

4. If I am teaching someone something new, I tend to:
   a) write instructions down for them
   b) give them a verbal explanation
   c) demonstrate first and then let them have a go

5. I tend to say:
   a) watch how I do it
   b) listen to me explain
   c) you have a go

After students know their learning styles, they are required to learn “while loop” and “array” function in LabVIEW software. The layout of the VAK learning package shows as below:

Figure 1: Layout of the VAK learning package

Moreover, the multimedia design use Gagne’s nine instructional events as the design foundation to design the flow of the multimedia teaching materials. Firstly, the news cut video can attract student’s attention easily. It can teach students the real application of the software. If the teaching materials can hold their attention, the new knowledge can put into short-term memory & long-term memory in student’s information processing system easily. It is because attention is the first and important step in the human processing system (高源令, 2010). Secondly, the teaching materials should be recalled student’s prior knowledge. The new knowledge can construct based on their prior knowledge. This arrangement matches with the construction theory, which indicate the new knowledge can develop from zone of proximal development (陳世芬, 2010). Finally, online instant feedback can provide in the middle stage and final stage. One advantage of multimedia can provide instant and fast feedback to students when it compares with the traditional written feedback. If students can get the instant feedback, it can get a strong reinforcement, improve their level of understanding and achieve assessment for learning principles. The detail multimedia design used Gagne’s instructional event shows as below:
<table>
<thead>
<tr>
<th>Instructional event</th>
<th>Corresponding design</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gaining attention</td>
<td>News cut video introduced first.</td>
<td>To arouse student’s motivation in order to help the memory process</td>
</tr>
<tr>
<td>2. Informing learners of objectives</td>
<td>Simple wording and graphic to show Objectives</td>
<td>To let students the aim and the expectations in learning</td>
</tr>
<tr>
<td>3. Stimulating recall of prior learning</td>
<td>Use Moodle to check students prior knowledge</td>
<td>To help recalling prior learning</td>
</tr>
<tr>
<td>4. Presenting the content</td>
<td>Present the content systematically and different VAK learning styles can use.</td>
<td>To construct interrelationships of different concepts with multi-channel learning</td>
</tr>
<tr>
<td>5. Providing learning guidance</td>
<td>To give a examples to explain the array</td>
<td>To maintain learning motivation</td>
</tr>
<tr>
<td>6. Eliciting performance</td>
<td>To give a short quiz (MC) in Moodle to do the formative assessment</td>
<td>To check students’ level of understanding</td>
</tr>
<tr>
<td>7. Providing feedback</td>
<td>To perform the summative assessment e.g. MC test and give an instant feedback</td>
<td>To check students’ level of understanding by instant feedback</td>
</tr>
<tr>
<td>8. Assess performance*</td>
<td>Provide scores of test results</td>
<td>To explain the difficult questions</td>
</tr>
<tr>
<td>9. Enhance retention and transfer*</td>
<td>To carry out a min-case study in laboratory in order to have an authentic assessment.</td>
<td>To carry out a min-case study in laboratory in order to have an authentic assessment.</td>
</tr>
</tbody>
</table>

*exercises will carry out in tutorial session and laboratory session

Table 1: Gagne’s Nine Instructional Events Design

**Development and Implementation:**
In the VTC, formal e-learning platform is Moodle platform, so it mainly uses in this study. Firstly, students need to do the VAK in the Moodle platform, the format of the VAK is in MC with graphical presentation. It is easy for students to catch up their learning styles. The format of VAK test shows as below:

![Figure 2: VAK test questionnaire](image)

It is found that student’s learning styles using visual and auditory type is 62.9% while kinesthetic styles is 37.1%. It is indicated most of the students are mainly used the visual and audit to absorb the daily information.

![Figure 3: Student’s learning styles pie chart](image)

Secondly, student need to carry out the online formative assessment in Moodle and google questionnaire via QR code. The format of questions shows as below:

![Figure 4: Sample of questions](image)
As Moodle platform can provide student instant feedback individually, students can enhance their knowledge by Moodle correct feedback. It can help to minimize the learning individual differences.

Thirdly, after students need to learn the basic functions of LabVIEW software using Gagne’s instructional design repeatedly, they carry out the formative assessment at middle stage of the course. The questions of the formative assessment are not only the bookwork questions, but also students need to analysis and apply the prior knowledge to solve a case study. The format of the case study shows as below:

Design a LabVIEW program (block diagram) to generate a random integer number between 1 to 1000. Then the random integer number will be run until matches a number specified “Number-to-Match” in the front panel. The matched number is indicated in “Current Number”, and the number of iterations is indicated in “# of Iterations” in the front panel.

Sample results in the front panel.

Figure 5: sample of formative assessment (case study)

**Evaluation and Results:**

There are several evaluation of this study. First, if students can know their learning styles, the overall performance in the formative assessment indicated that students who know their learning styles are better than the students who do not know their learning styles (Table 1). It is one solution to minimize the individual learning differences.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Students (who know learning styles) get correct answer (%)</th>
<th>Students (who don’t know learning styles) get correct answer (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>84%</td>
<td>80%</td>
</tr>
<tr>
<td>Q2</td>
<td>96%</td>
<td>87%</td>
</tr>
<tr>
<td>Q3</td>
<td>56%</td>
<td>54%</td>
</tr>
<tr>
<td>Q4</td>
<td>76%</td>
<td>75%</td>
</tr>
<tr>
<td>Q5</td>
<td>61%</td>
<td>43.5%</td>
</tr>
<tr>
<td>Overall</td>
<td>75%</td>
<td>68%</td>
</tr>
</tbody>
</table>

Table 1: Performance in online formative assessment

Secondly, as students go through several time of formative assessment in the multimedia platform, they need to carry out a test in the middle stage. The performance shows as below:

<table>
<thead>
<tr>
<th></th>
<th>Students (who have online formative assessment)</th>
<th>Students (who have not online formative assessment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>(Test pass rate %)</td>
<td>90%</td>
<td>60%</td>
</tr>
<tr>
<td>Mean</td>
<td>67.1</td>
<td>42.5</td>
</tr>
<tr>
<td>t-value</td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>P&lt;0.05</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Performance in mid-term test

It is found that the p value of the t-test is less than 0.05. By conventional criteria, this difference is to be statistically significant. Moreover, it also indicated that formative assessment could provide students to evaluate their level of understanding. As Moodle can give instant and individual feedback to students, this function can help to construct their knowledge. If students cannot get the passing marks in the online assessment, students can do the test again. This arrangement is a kind of mastery learning and it can reduce student’s individual differences.

**Conclusions**

Multimedia technology can enhance the traditional teaching method. It can also enhance student’s motivation, provide instant feedback, match different learning styles and speed, and minimize learning individual differences. ADDIE model can use to evaluate the usage of multimedia. In different formative assessment stages, Gagne’s nine instructional events principles can incorporate into the design of the multimedia materials. This arrangement can enhance the student’s motivation and minimize student’s learning individual differences.

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