Learning with Virtual Classroom Module, how Effective?

Dr. Nayereh Shahmohammadi

Research and Educational Planning Organization, Ministry of Education

Abstract: The college of Science of Payamenoor University, South Tehran Branch has already developed pre-recorded multimedia learning packages. These multi-media packages are Virtual Classroom Modules (VCM) which can be one of the most important tools of e-learning in the Open and Distance Education System. But is it true that students can learn more and better with such kind of e-learning tool like VCM? If yes, what can be the percentage? Is this tool really effective?

This paper discusses experiences in developing VCM with different authoring tools and evaluates their effectiveness. Students enrolled in the Basic Electronics course of “Electronics Engineering Diploma Programmes (EEDP)” participated in the study. This paper mainly focuses on the research findings about VCM Effectiveness. This may help to improve our present system for development of VCMs.

Key words:

Introduction about E-learning:

Today E-learning is referred to the systematic use of network information and communications technology in the process of learning and teaching. Learning with and by the electronic media is E-learning. Also, it refers to synchronous as well as asynchronous learning across the space, time and pace.

We knew about only Classroom Learning System, and Distance Learning System. But now E-learning System has created an impact on almost all aspects of teaching and learning process.

Now-a-days everyone talks of E-learning. The term E-learning has its own glamour and the institutes offering courses with this mode are looked at to be the prestigious one. This is like a Developed Country and Developing Country.

Some basic features of the E-learning environment are highlighted in this Table 1.

<table>
<thead>
<tr>
<th><strong>Table 1:</strong> Basic features of e-learning environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Learner-focused</td>
</tr>
<tr>
<td>• More “active” learning. Student can learn at his pace and time</td>
</tr>
<tr>
<td>• Instructors “deliver” knowledge</td>
</tr>
<tr>
<td>• Instructors “guide” the learners about Self-tests, and other links to help student to summarize their learning</td>
</tr>
<tr>
<td>• Instructors “model” good learning techniques through Online Testing, Online Counselling, and Student Services Forum</td>
</tr>
<tr>
<td>• Various media are used to stimulate the students for active participation in discussions and interactions</td>
</tr>
</tbody>
</table>

The most important feature of E-learning environment is that it can be designed truly for the learner, keeping in view the “learner’s autonomy.”

E-learning Tools:

Various tools of communication technologies are available to design learning system for the target group in E-learning environment. Some of these tools are as follows.

- e-mail one to one or one to many or many to many
- chat room, discussion board, news board,
- conferencing,
- threaded discussion forum,
- self-test centre,
- on-line counselling centre,
- student support services forum,
- virtual classroom, etc.

Institutes can plan E-learning activities for imparting education to their students as suggested by French, Hale, Johnson, & Farr (1999) to effectively support a self-directed and student-centred learning environment.

What is Virtual Classroom?

Virtual learning as described by French, Hale, Johnson, & Farr (1999) refers to the process of learning
and teaching via the Internet/ Electronic Media like CDROM, etc without any face–to–face contact between and among the participants. In this mode Internet/ Electronic Media replaces conventional lectures, creating new opportunities for self-directed and flexible learning. Keeping in view the technological limitations like bandwidth, internet accessibility, cost effectiveness, etc., the College of Science of Payamenoor University, described Virtual Classroom to suit and satisfy most of the needs of the students and the educators. Conventional Classroom situation for a single topic is visualised and accordingly. Virtual Classroom situation is visualised, this evolved the term “Virtual Classroom Modules (VCM)”. According to School of Science and Technology; Virtual Classroom Modules are described as “wellprepared high quality lectures” from the master trainers, with multimedia colour presentation. VCM combine distance education instructional pedagogy with latest interactive multimedia Internet technology. VCM helps counsellor efficiently to perform his/her basic job of providing information in less time, without compromising with quality. Thus, s/he can utilise remaining time for developing higher-level mental abilities like comprehension, application, analysis etc. These VCMs have been developed by a specified procedure and in the format that is designed and described by the School. Finally CDs recorded from master trainers are provided to the students to enhance and enrich the learning in the distance education mode.

In VCM development, intentionally the use of video is kept to minimum possible level, and normally restricted for imparting only skills. Hence, easy and fast production of good quality VCMs is possible.

Discussion and/or tutorial along with real counsellor and fellow students are expected to follow these lectures at each study centres. Here the role of counsellors changes to facilitator. For this work, researcher studied the literature and gone through the current practices of VCM Development followed in this college. Thereafter, researcher developed VCM in Visual Basic for the topic “Diode Applications as Rectifiers”. This topic was selected by following exhaustive process. Thereafter, researcher tried to get the answers for the question whether the learning with the developed VCM is effective or not?

**Research Methodology:**

This research study was designed for Quasi-Experimental Design methodology. Content Pre-test and Post-test is used to collect the data. Sampling method was used to select samples for this research work. From the Nashik Region about 30 students enrolled at semester 4 of Electronics Engineering Diploma Programme and studying Basic Electronics-1 Course were selected for testing. This data was analysed using Basic Statistics techniques.

**VCM Development Process:**

**A) Selection of Content for VCM:**

International Standard norms were followed to develop this VCM for the content Diode Applications: Rectifiers. Accordingly the content selected for VCM was analysed and the topics for the theory and for practical classified as shown in Fig. 1.

**Fig. 1:** Content of VCM.

Sub-topics covered in this VCM are as shown in Fig. 2, 3 and 4.
The whole VCM is recapitulated in **Summary** to enforce what the learner has undergone previously. E-learning content is developed for non-linear learning. With the navigational controls used in the VCM, the learners used to move around any topic covered in the CD-ROM. Hence well-defined **Key Terms** used in this product help the learners while studying the content.

**B) Selection of Media:**

All circuit diagrams, graphs, video clip, tables and graphics were prepared. Similar exercise done for the laboratory experiments meticulously. All the required circuit diagrams, graphs, charts, tables, input and output waveforms, etc. were drawn with the help of ‘Microsoft Power Point’ on the computer to use as and when required.

**C) Selection of Authoring Tool:**

Among the various authoring tools researcher selected **Visual Basic 6 (VB6) Programming Language** to develop the content of this product in presentable form since it offers extensive teaching capabilities. With this tool window based application is quickly and easily designed. VB6 provides a graphical environment in which developer visually designed forms and controls of the applications, compatible for the web-based applications and supports many useful tools. Applications developed in programming language tend to execute quickly on minimal computer platform and also software cost tend to be low.

**Presentation Strategy:**

Researcher prepared user interface for each screen to reduce the learning time and to enhance the efficiency of the user. Screen design, position for buttons, text, font, size, colour, and background all parameters are fixed mostly as per the International Norms.

**Actual Programming and Screen Design:**

Screen design is an integral part of all instructional E-learning applications. Attention to the elements on the screen can often determine the success or failure of such kind of product. Peter Fenrich (1997) rightly says,
“Instructional E-learning technology offers the potential to teach in ways that can not be done with the traditional methods.” To ensure the sequence of the screens appearing on the screen and to prevent the wasted effort, researcher planned all the screen design in advance with following specifications for many screen characteristics.

- Screen size, Colour palette
- Locations for screen components
- Specific colour choice and appearances of screen components
- Fonts and sizes for screen components
- Sizes of video images and graphics
- Menu designs, Icons and text matter
- Availability of utilities (Glossary, calculator, etc)
- Methods of accessing control options
- Methods for entering inputs

With this planning, inputs and content, researcher developed this user-friendly product in Visual Basic 6 programming language to increase motivation, improve attitudes, and reduce fears with ultimate simplicity and clarity.

Selection of Sample:
The product i.e., VCM was developed on the topic Diode Applications: Rectifiers was observed on the students enrolled to Semester 4 Basic Electronics course of Electronics Engineering Diploma Programmes offered through distance mode at their recognised study centres by the College of Science. This product was tested on the enrolled students. Researcher supplied following material to all enrolled students.

1) Pre-Test Questionnaires
2) Post-Test Questionnaires
3) Product: CD-ROM
4) Installation Instructions

The listed activities were carried out at all students.
1. The awareness level about the subject matter was tested during the Pre-test.
2. After a gap of nearly 21 days, respondents gone through the VCM developed on the computer.
3. Then Post-test was conducted to get the feedback about response in understanding the content of the product VCM.

Analysis and Interpretation of Data:
Through the Pre-Test and Post-Test questionnaire the data was collected. Respondents were asked to tick mark the most correct options wherever box is present and to write down where line is present.

The basic purpose of feedback was to measure the knowledge understanding about Diode Applications as a Rectifier before dissemination and after dissemination with the help of this VCM. The format of questionnaire was as shown in the Table 2

<table>
<thead>
<tr>
<th>Table 2: Format of questionnaire.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Questions</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>General Questions</td>
</tr>
<tr>
<td>Awareness/Content-based Questions (Pre and Post-Test)</td>
</tr>
<tr>
<td>Quality of Product</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

The analysis of each data was interpreted wherever it was necessary.

Classification According to General Information:
Following table gives details about general information of the respondent students. From this table, it was seen that 86% sample respondent students were in the age group 15-22 years and only 14% sample respondent students were in the age group 23-29 years. This indicates that for this Engineering Diploma Programme, young and fresh students below the age 22 years take admission. About 64% respondents had access to computers but 26% respondents did not have access.

<table>
<thead>
<tr>
<th>Table 3: Classification according to General Information.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group (Years)</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>% of Respondent Students</td>
</tr>
<tr>
<td>15-22</td>
</tr>
<tr>
<td>23-29</td>
</tr>
<tr>
<td>Total %</td>
</tr>
</tbody>
</table>
It was also observed that employed students are 25% of and unemployed respondent students are 75% of the total respondent.

**Post-Test Feedback Analysis:**

Post-Test feedback analysis was important to examine the enhancement in the knowledge level of the respondent student after completing the study of product i.e., VCM on the computer system. The total 36 responses for the Pre and Post-Test were analysed. This feedback was very important to judge the effectiveness of the product developed. Then mean of the pre-test and post-test score of all the respondent students were calculated to average out the responses. Thereafter, standard deviation of both the scores of all the respondent students was calculated to determine the maximum variation in the score of the respondent students in pre and post-test. T-test was applied to analyse the Pre and Post Test feedback. This data is tabulated as follows.

<table>
<thead>
<tr>
<th>Table 4: Pre and Post-Test Responses of all Respondents.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>No of Respondents (N)</td>
</tr>
<tr>
<td>Mean of score (M)</td>
</tr>
<tr>
<td>Difference betn Mean(DM)</td>
</tr>
<tr>
<td>Mean Percentage</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Standard Errors of Mean(SED)</td>
</tr>
<tr>
<td>Correlated Mean (r12)</td>
</tr>
<tr>
<td>Significance of difference betn Correlated Means (SED)</td>
</tr>
</tbody>
</table>

It was revealed that the respondent students had knowledge about the topic Diode Applications and Rectifiers about 14% before the dissemination of Virtual Classroom Module developed. Thereafter, Post-Test data was analysed. From this data it is revealed that the mean value of the correct responses received in Post-Test was more than the mean value of the correct responses received in Pre-Test. This post-test mean value was 34.58%. The difference between the pre and posttest mean score is 24.58%. This indicates that the correct responses obtained in the Post-Test have 24.58% higher value as compared to the Pre-Test responses of respondent students. It is clearly visible from this the knowledge level of the respondent students has enhanced during the Post-Test.

Standard T-test was used to analyse and compare both the scores received in the Pre and Post-test by the respondent students. Further calculations are described in Table 4. Critical ratio of T-test calculated was 16, which is most significant value.

Qualitative Feedback About the Product by the Respondent In Post-Test 4 questions were asked to judge the quality of the product. This collected data was classified and analysed. Accordingly following conclusions were observed.

1. Out of 36 respondents, 50% respondents were of opinion that the more than 75% content presented in this VCM was well understood and only 3% respondents could not understood the content presented in this VCM. This classification helped researcher to estimate how much content the respondent students easily understands with this Virtual Classroom Module (VCM).
2. From the total, 52% respondents were of opinion that they could perform experiments on rectifiers without the help of instructor and with the help of this VCM in the range more than 50% and but less than 75%. About 30% respondents could perform experiments on rectifiers more than 75% without the help of instructor and with the help of this VCM. Only 6% respondents could not perform the experiments with the help of this VCM. This clearly shows that respondent students were able to build confidence level to perform the experiments more independently without the help of instructor at their study centre with this Virtual Classroom Module.
3. From the total 58% respondents could get enjoyable learning experience with this CD-ROM, in the range more than 50% and but less than 75%. This has helped to conclude the quality of CD-ROM and ultimately VCM developed was of best quality achieved. Out of the total, 25% respondents could enjoy learning with this CD-ROM on rectifiers more than 75%. Only 6% respondents could not find enjoyable learning with this CD-ROM.
4. The content of this VCM was very well understood due to the use of following:
   i)Use of Graphs, Charts, Visual graphics
   ii) Simple and clear language and sufficient content depth
   iii) Focus on important points
   iv) Logical presentation of the content
   v) Wide coverage with theory and practical content
   vi) Use of Self-Test and its feedback mechanism
   vii) Repeatability
Conclusion:
This research proved that the respondent students very well received the Virtual Classroom Module (VCM) developed for the content Diode Applications as Rectifiers. This rise in knowledge gain level is 24.58% higher than the previous gain level. This speaks that respondent students understood the content of Diode Applications as Rectifiers. The various data interpretation table mentioned earlier could support this. It is further experienced that the respondent students expressed their true and genuine views about the subject matter. However it is worth to note that present investigation is limited to the extend of awareness level only. General, social, educational and other background of the respondent students contribute in a large extend to understand the subject matter (message) communicated. It is also observed that the VCM developed in the form of CD-ROM, found to be useful and effective, thereby fulfil the purpose of creation. The learning with VCM was really effective for the content developed by the researcher.

Scope and Limitation of Research Problem:
The VCMs developed for this course will be useful to all the students enrolled for the Engineering Diplomas of any disciplines in Conventional as well as in Open and Distance Education System. The application of this VCM is wide, but this VCM can be presented in much more user friendly manner by using different authoring tool and media.

REFERENCES

Jegede, O.J., 1992. “Constructivist Epistemology and its Implications for Contemporary Research in Distance Education”, In T. Evans & P. Juler (Eds.) Research in Distance Education Vol. 2, Geelong: Deakin University Press.