Project Base Learning for IT Personnel Resources Development using TVML

Tansuriyavong Suriyon, Endo Takanobu and Boonmee Choompol

Abstract—Using the animations video of teaching materials is an effective learning method. However, we thought that more effective learning method is to produce the teaching video by learners themselves. The learners who act as the producer must learn and understand well to produce and present video of teaching materials to others. The purpose of this study is to propose the project based learning (PBL) technique by co-producing video of IT (information technology) teaching materials. We used the T2V player to produce the video based on TVML a TV program description language. By proposed method, we have assigned the learners to produce the animations video for "National Examination for Information Processing Technicians (IPA examination)" in Japan, in order to get them learns various knowledge and skill on IT field. Experimental result showed that learning effect has occurred at the video production process that useful for IT personnel resources development.

Keywords—TVML , T2V Player, The animation made as learning materials, National Examination for Information Processing Technicians, IT Education, Problem Based Learning

I. INTRODUCTION

IN recent years, the necessity for IT personnel resources development is an important and urgent theme on the occasion of rapid development of the information industry.

In Japan, a national examination called a "National Examination for Information Processing Technicians" or IPA examination exists as one index to point out that IT engineer is mastering the knowledge and skill of a demand standard level.

This certifying examination with 40 years of history is trusted by many IT companies, and is used also as evaluation criteria of entrance examination into a company of IT engineer [1].

Considering of IT human resource development, it can say that one arriving point is to acquire this certifying examination.

In order to learn the contents of such a certifying examination, what kind of study methods are there? Most learners will take the method of studying using books, such as a reference book or a past test collection book etc.

However, except for books, there are several study methods e.g. using multimedia material, using the Internet, and so forth. Many precedence researches are carried out especially about effective of the study method using video teaching materials [2][3][4]. It turned out that it is an effective learning method as a result.

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As for such video teaching materials, it is common to use the distribution video teaching materials from TV or the Internet. However, by this research, without using the already distributed video teaching materials, we get learners as a "producer" to produce the video teaching materials of IPA examination by themselves. In order to make the video teaching materials of API examination, it is necessary to have sufficient knowledge for learners to explain skillfully to produce and present video teaching materials to others.

If the producer who will produce the video teaching materials does not have enough knowledge, they will make an effort to acquire knowledge more to explain video teaching materials intelligibly to a viewer. This action will lead the producers to build up their knowledge and skill on IT filed.

This research proposes the method of using project base learning (PBL) for IT personnel resources development through video teaching materials production.

In this research, we divide learners in to a small group and assigned them as a producer to make a couple of video teaching materials. So that one person's burden of video production is suppressed. Then we share the video teaching materials among the learners. It becomes possible to learn other items of IT from those videos.

However, if we make video teaching materials by usual method that use video camera, it cost time and effort. For example, we have to begin from preparing equipments and a studio, preparing a commentator before video is actually taken. Finally, we have to edit the recorded video to complete the work on PC. Much technical knowledge and skill are needed for this work. Moreover, costs of equipments are also high and must be prepared for every group. To avoid this problem, in this research we decide to use TVML (TV program description languages) for making video teaching materials at low cost.

II. VIDEO TEACHING-MATERIALS PRODUCTION BY TVML

A. TVML

TV program description language TVML is used in production of video teaching materials. TVML (TV program Making Language), was proposed by Hayashi and others of NHK Science & Technical Research Laboratories in 1996[5][6]. It is the technology which enabled production of the TV program text-based one. Even if television broadcasting is already over 50 years, it can be said that the TV program content is difficult for ordinary people to produce. TVML aimed at making many ordinary people can make TV program content easily.

This motive should also show that the production method is easy when compared to other image production methods. The fundamental description method is as follows.

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Character: talk (name= A, text="HELLO")

This is a script makes CG character "A" says "HELLO". One event is fundamentally described in one line. Not only can a character, the position of a camera, a setup of stage properties, processing of an image and animated moving events are also can be described.

The TVML player software which makes a TV program in this language is distributed free of charge. The hardware requirement is Windows XP/Vista and Mac OS 10.3.

B. The T2V Player

T2V player is a TVML-based freeware which can describe TVML mentioned above in the form closer to a Japanese script. Type words and a command into a text box, a video image is outputted (refer to Fig. 1). This is the module called FIL (Flexible Interpretation Loader) that embedded in T2V player. It corresponds to various input forms very flexibly.

This format is very easy to understand to those who do not have much knowledge of programming. We use T2V player in this research. It becomes the merit of not spending long time to learn operation of software to make video teaching materials.

C. Proposal of Learning Method through Video TeachingMaterials Production

This research proposes the method for IT personnel resources development through video teaching materials production.

The video teaching materials made by this research is targeted at the [morning section of the Fundamental Information Technology Examination (FE)] which is a one of National Examinations for Information Processing Technicians (IPA examination) in Japan.

We assign learners a past test and have them make a video of answer's explanation. Knowledge and skill of IT engineer can be acquired in process of video production. At last, the completed video teaching materials are shared all together; much knowledge can be learned by studying from those videos.

IT personnel resource development is aimed at by this proposal technique.

III. IMPLEMENTATION METHOD OF VIDEO TEACHING-MATERIALS PRODUCTION OF IPA EXAMINATION

We get the first-year student of Media Information Engineering Department of the Okinawa National Collage of Technical into a target of IT personnel resources development. A total 42 students are taken into this program as a video producer.

Project base learning (PBL) technique is adapted and conducted under instructor's observation.

The 100 minute (=1 period) lesson is conducted 12 times in total. The detail is as follows.

0.5 periods --Explanation of the aim of a lesson
               --Learn operation of T2V player.
               --Assignment of a past test.
10 periods --Study a past test, and produce the video teaching materials using TVML.
1 period --Evaluate video teaching materials each other
0.5 periods --Answering of a questionnaire

In this research, we divide students into 21 groups, two-person for each group. We assign 4 past test of a Fundamental Information Technology Examination (FE) to each group. The past test that we used is the test of the spring and autumn of the 2009 fiscal year.

The video of answer's explanation were produced. Finally, 80 video teaching materials were produced.

IV. EVALUATION AND CONSIDERATION OF LEARNING EFFECT

After production of video teaching materials is over, the questionnaire about the learning effect through video teaching materials production was carried out to the first-year student who is a producer. The opinion on the video teaching materials production using TVML is also asked.

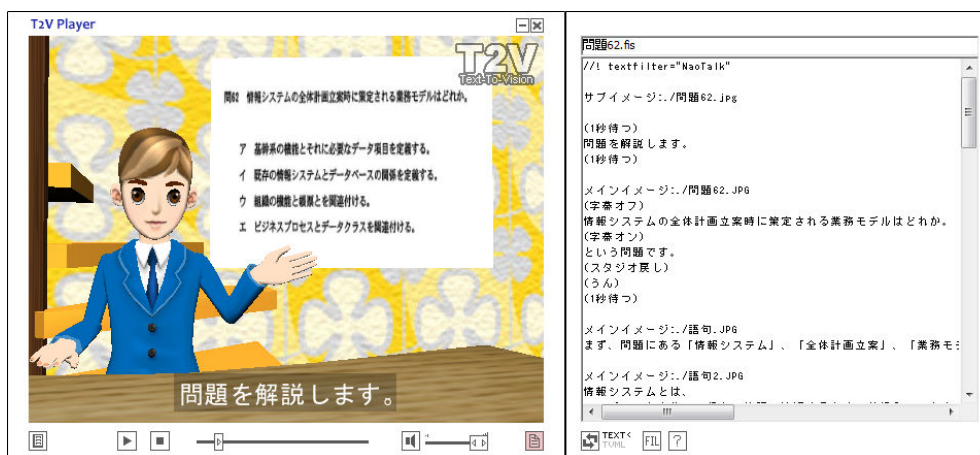The usefulness of these video is evaluate by the fourth-year

Fig. 1 User interface of the T2V player

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and fifth-year student (a total of 68 students) of the same college and same department. We consider those 68 students as the user side and carried out another kind of questionnaire to them. The user means those people who do not participate in production of video teaching materials.

A. Evaluation form producer side

The questionnaire to the producer side carried out to 42 persons. A question was mainly asked about the evaluation of the video teaching materials produced by TVML, and the evaluation of the learning technique using video teaching materials production.

● *Evaluation of Expression Ability of Video Teaching Materials in TVML*

At first, we investigated the expression capability of TVML whether it can express video animation as they imagined or not.

There is no student who answered that he/she was not able to express, about 90% of students were not suffering inconveniences to expression (refer to Table 1).

TABLE I
PRODUCER SIDE QUESTIONNAIRE ITEM 1

Q. Expression can be well performed as you imagined by TVML?	
It was able to express.	9.5%
Generally it was able to express.	26.2%
Normal.	54.8%
It was not able to express some case.	9.5%
It was not able to express.	0.0%

Next, we investigated about mistake correction. In the case that produces video teaching materials by video camera, immediately correction will be probably difficult. But, in the case of mistake correcting in TVML is easy.

TABLE II
PRODUCER SIDE QUESTIONNAIRE ITEM 2

Q. Were the video teaching materials which you produced able to correct it immediately when there was e.g. a broken link of the image file , the unnatural point of the voice or in the case to insert the additional scene?	
It was able to correct.	26.2%
Generally it was able to correct.	35.7%
Normal.	28.6%
It was not able to correct some case.	9.5%
It was not able to correct.	0.0%

Investigated result is shown in Table II. There was no student who was not able to correct. Since, mistaken is able to be corrected immediately, using TVML is help to save much time and effort.

After actually producing, we investigated whether it would be expected that T2V player is suited for video teaching materials production or not (refer to Table 3).

TABLE III
PRODUCER SIDE QUESTIONNAIRE ITEM 3

Q. Do you think that the TVML is suitable for video teaching material production like this time?	
It was suitable.	23.8%
Generally it was suitable.	52.4%
Cannot say whichever.	19.0%
It was not so suitable.	4.8%
It was not suitable.	0.0%

The questionnaire is also taken in the form of free description about the reason why that TVML is suited for?

Some answers to this question are quoted below.

"Q. Do you think that the TVML is suitable for video teaching material production like this time?"

Answer: suitable -- since creation of an animation is easy. It will take enormous time, if an animation is made from scratch to finish in short period of time.

Answer: suitable – a lot of function is provided; it is enough for the purpose of making such teaching materials.

Answer: suitable – it is no need to understand difficult programming language but Japanese, by this reason it was suited for production.

Answer: not so suitable -- because there is a point which is hard to catch in voice babble.

Answer: not so suitable – because the voice generated by text to speech (TTS) has likes and dislikes by people.

About 76% of students have answered that TVML is suited for video teaching materials production. They like the feature that a voice, image switching, camera work and so forth are producible by text-based description.

However, there was also an opinion that the quality of the synthetic voice currently used in TVML is not so good.

Even if TVML has a function of changing voice accent position, adjustment of voice speed to enable to make it easy to hear, it can be said that it is a sensitive voice of likes and dislikes for some student.

From the data of Table 1 to the Table 3, it can be said that the TVML language that embedded in T2V player that we used this time is sat isfying requirements enough for video teaching materials production.

● *Learning Effect through Video Teaching Materials Production*

Table IV to 6 is a result of questionnaires mainly concerning a learning effect that we have survey from the first-year student who were a producer.

First, we asked the first-year student as the producer about difficulty degree of 4 past tests that assigned to each group. As a result, the student who answered that "difficult" and "slightly difficult" exceed 60% (refer to Table IV).

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TABLE IV
PRODUCER SIDE QUESTIONNAIRE ITEM 4

Q. How about the degree of difficulty of an assigned past test (As a general impression)?	
It was easy	2.4%
It was relatively easy	9.5%
Normal	26.2%
It was relatively difficult	57.1%
It was difficult	4.8%

The target is a first year student who has no experience in IT. We investigated that they have known the assigned past test in advance or not is known (refer to Table V). There was no student who answered that they know assigned past test in advance. About 90% of student answered "I rarely knew it" or "It's the first I've heard of it ".

TABLE V
PRODUCER SIDE QUESTIONNAIRE ITEM 5

Q. Did you know the assigned past test content in advance?	
I knew it	0.0%
Generally I knew it	2.4%
I knew a little	9.5%
I rarely knew it	35.7%
It's the first I've heard of it.	52.4%

However, assigned contents of a past test are learned in midway of actually producing video teaching materials.

The answer to the question whether students mastered as their knowledge, about 80% of students have mastered. (Refer to Table VI).

TABLE VI
PRODUCER SIDE QUESTIONNAIRE ITEM 6

Q. Did you have learned assigned pas test contents, and mastered it as knowledge?	
Yes, I did.	19.0%
I rather say "yes".	57.1%
I cannot say whichever	19.0%
I rather say "no".	4.8%
No, I did not.	0.0%

Considered from the results of an investigation from Table 4 to Table VI the first-year student who became a producer has a little of knowledge. Before making video, we were able to see many students thought that the contents of assigned past test were difficult. The result after making video shown that studying the contents of past test and producing the video teaching materials is make many students mastered in IT as knowledge of their own.

Therefore, it could be said that it was proved that learning effect exists in the process of video teaching materials production.

B. Evaluation from User Side

After PBL of the video teaching material production by the first-year student was over, we carried out a questionnaire to 68 of fourth and fifth-year student as an evaluation from the user side.

The evaluation questionnaire from the user side collected the opinions of the person that only used the video teaching material of this research without being engaged in production.

We get the user watch video teaching materials produced by first-year student before we have a questionnaire.

At first, by questionnaire item 1; we investigated whether a user had an experience of taken an IPA examination or not. 64.7% of fourth and fifth-year student as the targeted users, answered that they had experience of taken an IPA examination.

As the same with having asked the producer, video teaching materials were shown to the user then the understanding degree of the contents was investigated (refer to Fig.2).
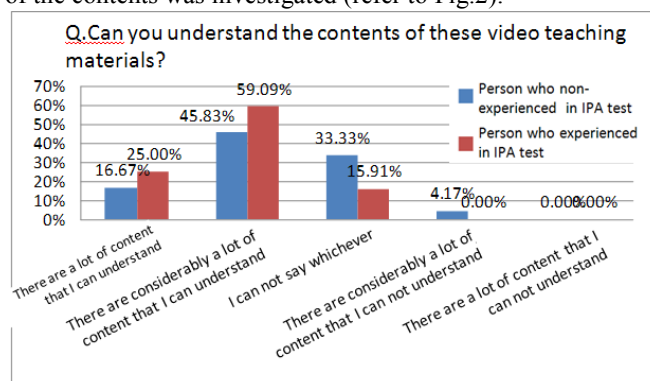

Fig. 2 An answer result of questionnaire item 2 from user side

The result of understanding degree, as we expected, the percentage of person who experienced in IPA test was higher than the person who did not.

However, even if we look at the result of the person who is non-experienced in IPA test, the understanding degree is not so low. [There are a lot of content that I can understand] and [There are considerably a lot of content that I can understand] is more than 60%.

After showing video teaching materials to user, before getting user to answer to a questionnaire, we have explained that the video teaching materials is produced by a TVML and T2V player is free software.

Based on that explanation, we got the user to answer whether the expression of the video teaching materials produced by using TVML is satisfied enough to watch or not (refer to Fig. 3).
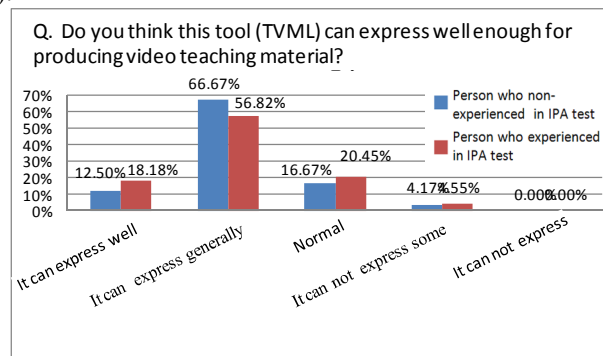

Fig. 3 An answer result of questionnaire item 3 from the user side

As a result, the student who answered "It can express well" and "It can express generally well" was more than 70%.

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We also investigated whether the user would like to actually use video teaching materials by TVML of this research (refer to Fig.4).
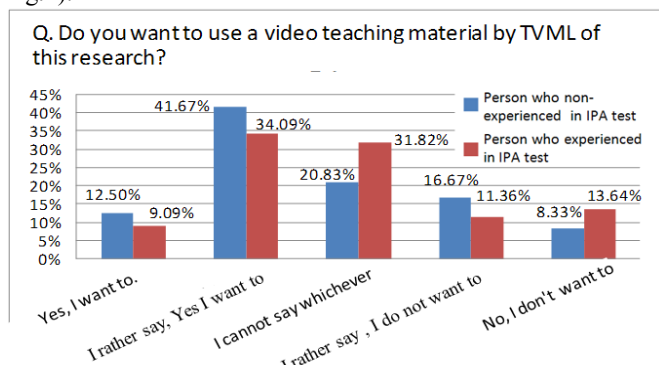

Fig. 4 An answer result of questionnaire item 4 from the user side

As the result, the percentage of the person who non-experienced in IPA test that wants to use these materials is higher.

The percentage of the student who is experienced and who is non-experienced in IPA test thought that they want to use these materials are 43% and 54% respectively.

This research also gets the user answer in a format of free description about the reason. The question is "Q. Do you want to use a video teaching material by TVML of this research?" Some descriptions are quoted below.

Answer: I will use. It is because there are a lot of parts which we cannot easily understand only by reading books by oneself (Student who is experienced in IPA test).

Answer: I believe I rather use. I think that I can understand more deeply if I combine with the learning method in the usual books (Student who is inexperienced in IPA test).

Answer: It can be mentioned neither of use. Although I have studied satisfactorily also with books materials, I will consider to use if these video teaching materials are more easy to understand (Student who is experienced in IPA test).

Answer: I do not believe to use. Although videos are well accomplished of explanation, my study is not made at the speed which I wish to progress (Student who is experienced in IPA test).

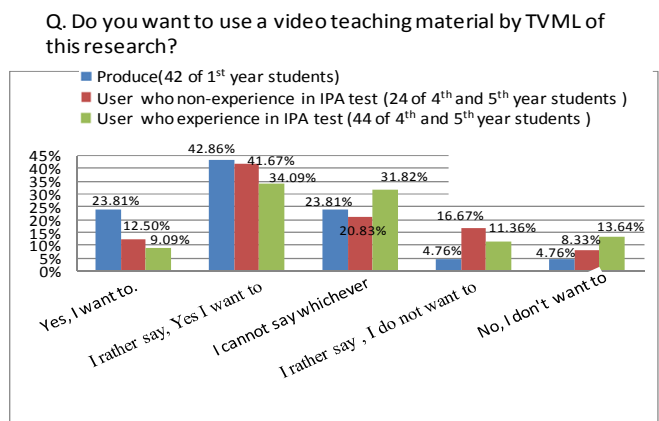We also asked the same question to the first-year student who is a producer (refer to Fig.5).

Fig. 5 An answer result of questionnaire item 5 (asked both user side and producer side)

Percentage of the student who wants to use materials is as follow. A first-year student was about 66%, user side of a student who is inexperienced and who is experienced in IPA test was about 54% and 45% respectively.

As a result, it turned out that the positive for using was (1) first-year students who are engaged in the production itself and increase knowledge from now on, (2) the fourth or fifth-year student who is inexperienced in IPA test, (3) the fourth or fifth-year student who is experienced in IPA test, respectively.

As one reason which brings about such a result is because the student who is experienced in IPA test has already established their study method, the necessity of covering with new teaching materials is seldom felt.

Since the first-year student is familiar with the format of the video teaching material of this research through production, it can reason that it is highly motivated to accept for IPA learning material.

Therefore, it is thought that the video teaching material of this research is effective as learning means of learner with a little experience of the IPA test particularly a new learner.

V. CONCLUSION

The video teaching materials produced at present are 80 videos, which covered one season of the past test of Fundamental Information Technology Examination (FE, morning-part). However, it cannot be said that this number of the video teaching material is enough when we considered to really using it in the study of the IPA examination.

Like the first-year student whom we targeted this time, we will prepare the environment where the person who wants to take an IPA examination can produce video teaching materials cooperatively more in the future. If we can increase the number of available video teaching materials each time we have PBL (Project Based Learning), we can expect that it becomes the video teaching materials having high of the usefulness.

Finally, we hope that this video teaching material and collaborative learning technique become the help of the IT personnel development.

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