



PERSONALIZED LEARNING ENVIRONMENT: INTEGRATION OF WEB TECHNOLOGY 2.0 IN ACHIEVING MEANINGFUL LEARNING

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ABSTRACT

Malaysian education system is dealing with constant changes related to learning models and the use of technology in teaching and learning (T&L) process. Personalized learning has been identified to be able to increase students' achievement. Several Web technology 2.0 tools such as Facebook, WordPress, Twitter, YouTube, Prezi and PowerPoint have been identified to support personalized learning environment. Many studies have been conducted to identify the efficiency of Web technology 2.0 in T&L. However, studies on identifying the efficiency of the integration of Web technology 2.0 through personalized learning in achieving meaningful learning are limited. This study aims to identify the extent to which the integration of Web technology 2.0 through personalized learning environment is able to achieve meaningful learning. Document analysis and visual method approaches are used in this qualitative study. The visuals obtained related to the use of Web technology 2.0 were analyzed together with the documents such as reflection journals, working papers, storyboards, posters and educational videos produced by 61 second-year students enrolled in a Bachelor of Education in Teaching English as Second Language. The findings show that the integration of Web technology 2.0 in personalized learning environment is able to assist the academicians in increasing the quality of T&L. Through the use of Web technology 2.0, all five attributes of meaningful learning are achieved. This study hopes to assist academicians to integrate suitable Web technology 2.0 to personalized learning environment. This study also hopes to have significant implications for the education system by increasing the quality of T&L and by fulfilling the national aspiration.

Keywords: Web Technology 2.0; Personalized Learning; Meaningful e-Training Integration Model; Meaningful Learning; Document Analyses

INTRODUCTION

Rapid advancement of Web technology 2.0 globally has captured the attention of the students, teachers and educational institutions in applying the technology in the classroom. Most of the educational institutions have encouraged the use of Web technology 2.0 in their teaching and learning (T&L) process across all levels of education. This is due to the free, accessible and easy to use technologies. In addition to that, Web technology 2.0 is able to assist the students in their learning process and the teachers in designing effective lessons (Hamdan et al., 2013; 2015b). Malaysia, Thailand, Indonesia and many other countries in the world have integrated Web technology 2.0 in T&L (Fristchi & Wolf, 2012; Howe & Kekwaletswe, 2010; Maknun, 2013; Seechaliao, 2014).

The Malaysian education system is moving along with the advancement of technology. Most higher education institutes (HEI) and schools integrated technology in hybrid learning. Universiti Kebangsaan Malaysia (UKM) is one of the HEIs that integrated several suitable Web technology 2.0 tools in the classrooms. In addition to that, smart schools have also integrated information and communication technology (ICT) and several Web technology tools in T&L.

However, the implementation of this approach is not comprehensive yet. This is due to the fact that there are schools in rural and remote areas that suffer from the shortage of infrastructural facilities. Besides that, a study conducted by Adnan et al. (2013) discovered that the lecturers of Program Pensiswazahan Guru (PPG) were faced with technological challenges in applying e-learning. Those lecturers were facing difficulties to access their learning portal due to a slow Internet network. Therefore, all challenges faced in the implementation of the latest technology in improving the quality of T&L have to be overcome immediately.

The Integrated Meaningful Hybrid eTraining (I-MeT) Model is a learning model that integrates hybrid learning, Web technology 2.0 and Problem-Oriented Project-Based Hybrid e-Training (POPeYE) teaching strategy in achieving meaningful learning (Din, 2010; Din et al., 2010; 2011). POPeYE's learning strategy emphasizes the teaching design related to authentic problem solving in daily life (Din et al., 2009). This strategy is an extension of teaching from the Problem-oriented Problem-based Learning strategy (Dirckinck-Holmfeld, 2002; 2010). Some of the Web technology 2.0 tools integrated through personalized learning in I-MeT Model are WordPress, Facebook, YouTube, Twitter, Prezi, PowerPoint, Google Docs, e-mail, and Adobe Photoshop, Sony Vegas Pro, iMovie and SoundForge software. I-MeT Model was applied by the second year students enrolled in a Bachelor of Education in Teaching English as a Second Language (TESL) in an Educational Technology course. T&L activities involving students were planned through the implementation of five attributes of meaningful learning by Din et al. (2009), Din et al. (2010; 2011; 2012) and Jonassen (1995) which are (i) active, (ii) constructive, (iii) cooperative, (iv) authentic, and (v) objective learning in I-MeT Model with the combination of Web technology 2.0. Thus the objective of this study is to

identify how the integration of Web technology 2.0 through personalized learning may achieve meaningful learning.

Personalized learning is an active learning process focusing on the students. The findings of the previous studies indicate that the overall achievement of the students increased after following their personal learning styles and formats (Larkin-Hein & Budny, 2000). Through personalized learning the students are able to access a unique learning experience based on their needs. Therefore, the needs of the students have to be flexible and prioritized so that the students are able to manage how, what, when, and where they have to study. Personalized learning has been known over the last few centuries and now it has become a phenomenon in the world of education. Personalized learning has been around since the 19th century, when Helen Parkhurst formulated the Dalton Plan (Izmestiev, 2012). This plan emphasizes that each student is able to design their curriculum to fulfill their needs, interests and capabilities. This aims to (i) promote independence and trustworthiness, and (ii) improve on social skills and responsibility towards the community. Personalized learning has developed since then. According to Izmestiev (2012), Victoria Garcia Hoz was the first person to coin the term personalized learning in the context of educational science in 1970s when there was little to none online learning. However, in the 21st century, personalized learning has once again been known and implemented with the use of technology.

Personalized learning environments are the personal working spaces for each online learning student which are supported with Web technology 2.0 and social media networks. These working spaces are built and controlled by each student in dealing with the learning process (Shaikh & Khoja, 2014). Personalized learning has a big potential to be used by the academicians in HEI with the advancement of ICT and digital content development tools. According to Mohd et al. (2013), the integration of technology in T&L contributes towards the success of the implementation of personalized learning environment. Therefore, opting for a suitable technology may improve the quality of T&L and achieve the meaningful learning sought by the students. A study conducted by Patrick et al. (2013) outlined 12 elements of lesson and curriculum design that support personalized learning. These elements are essential and need to be followed through in order to ensure that personalized learning is able to be implemented among the students. In addition, these elements are supported by few related studies. Table 1 indicates the 12 elements for lesson and curriculum design.

Table 1. 12 Elements of Lesson and Curriculum Design (Patrick et al., 2013)

Elements	Explanation	Related studies
Active participation	Learning requires active and constructive participation from the students	Elmore et al., 1996; Piaget, 1978; Scardamalia & Bereiter, 1991
Social participation	Learning is a social activity and the participation in the social living in the educational institutes is important to allow learning to occur.	Brown et al., 1996; Collins et al., 1989; Rogoff, 1990; Vygotsky, 1978
Meaningful activities	Students will learn better when they take part in each activity deemed useful in actual life and which are related to culture.	Brown et al., 1989; Heath, 1983
Associating new information with the existing knowledge	New knowledge is built on the matters that have been comprehended and trusted.	Bransford, 1979; Bransford et al., 1999
Strategic	Students will learn more effectively when using effective and flexible strategies in helping them to understand, give reason, memorize and solve problem.	Mayer, 1987; Palincsar & Brown, 1984; White & Frederickson, 1998
Involvement of self-regulation and reflective	Students must know how to plan and observe their learning, ways to set the aims of their learning and how to correct any mistake.	Brown, 1975; Boekaerts et al., 2000; Marton & Booth, 1997
Redesign knowledge	Students must know the ways to deal with internal conflict and reorganize existing concepts when needed.	Carretero & Voss, 1994; Driver et al., 1985; Schnotz et al., 1999; Vosniadou & Brewer, 1992
Towards comprehension (not memorization)	Learning will be more effective when the materials are managed in accordance to general principles and explanations, and not based on the memorization of a fact or procedure.	Halpern, 1992; Resnick & Klopfer, 1989; Perkins, 1992
Helping students in knowledge transfer	Learning is more meaningful if the lesson is applied to real life situations.	Bruer, 1993; Bransford et al., 1999; Bereiter, 1997
Allocating time for practice	Learning is a complex and time consuming activity. Time is required to develop expertise in each field.	Bransford, 1979; Chase & Simon, 1973; Coles, 1970
Formation of individual differences	Students learn better when their individual differences are acknowledged.	Case, 1978; Chen et al., 1998; Gardner, 1991; Gardner, 1993
Shaping motivated students	Learning is critically influenced by students' motivation. Teachers may help the students to be more motivated through the actions and words of the students	Deci & Ryan, 1985; Dweck, 1989; Lepper & Hodell, 1989; Spaulding, 1992

Several types of Web technology 2.0 tools have been identified to support personalized learning and have been used fully by students and lecturers in UKM which are Facebook, YouTube, WordPress, Twitter and PowerPoint. These tools are the main technology tools in I-MeT Model implemented in Educational Technology course for the second year students of Bachelor in TESL. Figure 1 shows the attributes in I-MeT Model.

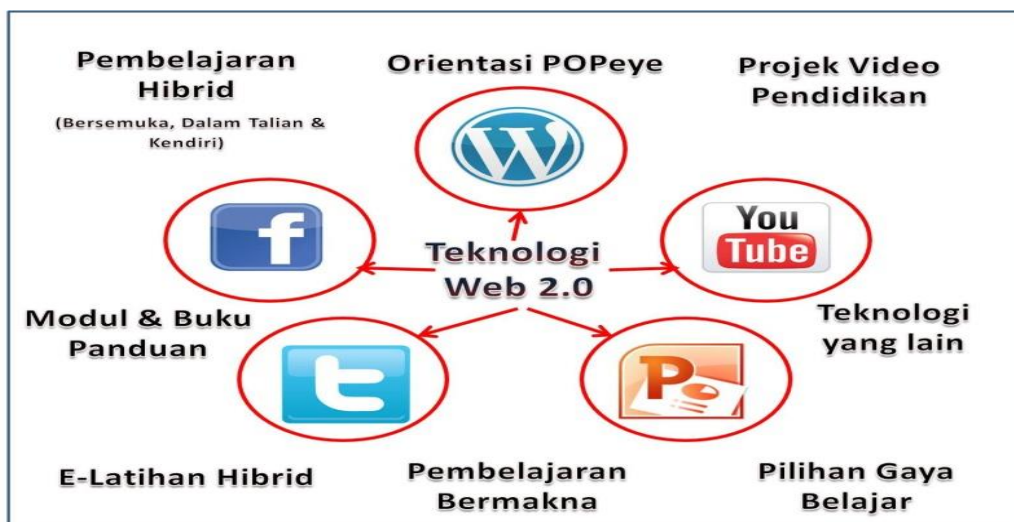


Figure 1. Attributes in I-MeT Model (Hamdan et al., 2013)

Prior to the integration of technology in I-MeT Model, several processes have to be conducted which were (i) selection, (ii) feasibility study, (iii) technology function identification and (iv) association with five attributes of meaningful learning. According to Hamdan et al. (2012; 2015a,b), the screening process was conducted during the selection for suitable technology in avoiding duplication of its functions. All functions of the Web technology 2.0 tools in Figure 1 have been identified before being integrated into I-MeT Model. Table 2 shows the categories, types, and functions of the tool associated with the attributes of meaningful learning.

Table 2. Category, Type and Function of Web Technology 2.0 Tools (Hamdan et al., 2013)

Category	Type	Function
Social Network Sites	Facebook (Facebook Group)	Discussion and sharing teaching aids
Blog	WordPress	Archives for all teaching aids and students' reflection
Video Sharing Sites	YouTube	Video presentation and sharing
Micro Blog	Twitter	Discussion, forum and information sharing
Presentation Tool	PowerPoint/Prezi	Course and Working Paper Presentation

Twitter has been used as the medium of personalized learning in achieving meaningful learning. According to Lowe and Laffey (2011), Twitter is a tool that supports learning and improves various learning outcomes. Twitter was chosen because of its popularity which was ranked third for Web 2.0 by EBizMBA (2014). In addition, the findings in the study conducted by Hamdan et al. (2013) state that Twitter is a Web technology 2.0 that was ranked fourth after Facebook, YouTube and PowerPoint which were the main selection of the students from one of the private colleges in Penang. Generally, Twitter only allows 140 characters for each post. This is to only let short and precise posts to be shared by the followers of the discussion. Similarly, it limits short and precise ideas to be shared in any discussion. However, if the respondents require more than 140 characters in expressing an idea, the Twitlonger.com application enables the users to write longer.

Meanwhile, WordPress has been used by the respondents in noting down their reflections on learning. Other than that, the respondents used WordPress as archives for teaching materials and e-portfolios that can be used as a reference in the future. WordPress was chosen as one of the tools for Web technology 2.0 that supports meaningful learning over Blogger. This is because WordPress has the advantage of enabling the creation of categories. Furthermore, according to EBizMBA (2014), WordPress was the fifth most popular tool. YouTube is one of the tools of Web technology 2.0 that is integrated with personalized learning environments in achieving meaningful learning. YouTube was chosen over other video sharing sites due to its popularity among the students based on the study conducted by Hamdan et al. (2013), its first place in

EBizMBA (2014) and its fourth place in Alexa (2014). YouTube is used by the students to upload the videos that they produced and leave an impact towards T&L (Abdullah et al., 2013). Finally, PowerPoint and Prezi have been fully used by the respondents to present working papers and final video project. The findings from the study conducted by Hamdan et al. (2013) indicate that the majority of the students chose PowerPoint as a tool to present information. However, Prezi too is one of the top choices of the students. In this study, both PowerPoint and Prezi are used.

I-MeT Model has been implemented in several courses in UKM (Din, 2010) and has been integrated in Educational Technology course in UKM since 2006. Hybrid learning which includes face-to-face, online and self-learning as well as the POPeye teaching are also integrated in I-MeT Model other than Web technology 2.0. All five attributes of meaningful learning are also applied to the model through personalized learning environment. A problem oriented educational video project was assigned to the students of the course. The groups with at least four members had to create a video that can (i) provide solutions for an issue, (ii) propose good opinion, (iii) associate the issue with real life situation, and (iv) provide awareness and lesson to the community and the nation. Based these criteria, the attributes of meaningful language – objective and authentic – can be achieved. In instilling active, cooperative and constructive learning, the students have to work together to generate ideas, list out important points and to draft the content of the video. The students have to play active roles in presenting the working papers and storyboards for the video project in computer labs by using PowerPoint or Prezi, learn the way to record, edit and combine the video with pictures, audio and texts before uploading into YouTube. Every discussion and material sharing related to the video project have to be done in Facebook Group with all team members, course lecturer and few facilitators connected to the group. Reflections have to be written or posted in the group WordPress blog and are archived for reference. Discussion on certain matters related to technology or education are conducted through Twitter or Facebook Group for the course.

METHODOLOGY

The respondents of this study consist of 61 students who were taking Educational Technology Set 2 course. They were second year students in a Bachelor of Education in Teaching English as Second Language in UKM. The respondents were identified to have basic skills of ICT. Their involvement in this study is voluntary. The approaches used in this qualitative study are document analysis and visual method.

Documents such as working papers, students' reflections in blog, storyboards, posters and videos produced by the students are analyzed and categorized based on the personal learning environment. Document analysis is one of the qualitative data that obtain data in documents, pictures, audio visual materials and students' assignment (Anderson, 2010). Document analysis is able to provide information based on observation and researcher's analysis on students' assignment, audio visual materials, posters and online interactions (Devetak et al., 2010).

The visual method is one of the ways to collect data. There are several types of visual data which are (i) images found, (ii) images created by the researcher, and (iii) images created by respondents. This method can be used in studies that require assessment on photographs, posters, videos, storyboards, and media images. According to Bagnoli (2009), this method is able to produce a holistic and comprehensive assessment of a document. Thus, this method is used with document analysis in this study.

Each document such as working paper, storyboards, posters, videos and students' reflections are analyzed, interpreted and categorized to give meaning on the assessment of each document. According to Bowen (2009), there are several processes to be done repeatedly in analyzing data. First, each document will go through the skimming process. This process is to obtain a clear summary of the document to avoid biasness. Second, the reading process will be done on the written document. This process will be done meticulously in order to answer the research questions. For this purpose, a rubric will be used to help the researchers analyze and evaluate the documents. Each evaluation will be based on the criteria set. Finally, interpretation has to be done on content analysis which can be formed based on the results of the document analysis. In the visual methods, each document received from the respondents, either individually or in group, will be assessed. The assessment made by the researcher is based on a check list and will be followed by interpretation.

FINDINGS AND DISCUSSION

Document Analysis and Visual Methods based on the Integration of Web technology 2.0 in Personalized Learning Environment

Figures 2 – 7 show the section of Web technology 2.0 tools used by the respondents in going through the T&L process. The respondents experience learning through a personalized learning environment by integrating Web technology 2.0 tools such as Facebook, Twitter, WordPress, YouTube, and Prezi. Figure 2 shows the video project produced by the respondents and was discussed with the lecturer and researcher through Facebook. Based on the figure, the respondents were actively involved and socialized throughout the learning process through discussion among group members and interactions with the lecturer and facilitators.

Learning through Facebook can happen anytime and anywhere. The tools needed to access Facebook include laptops, smart phones and PC tablet. The respondents used Facebook and other social network sites such as Twitter to express ideas and take part in discussions. The elements of personalized learning applied by the respondents in using Facebook are active participation, social participation, and redesigning knowledge by learning new things through solving conflicts in creating the video. For example, the respondents asked for opinion and advice from the lecturer, facilitator and researcher regarding the draft of the video that they had prepared. The students observe and improve their video based on the comments given even though it contradicts with the opinion of other member of the group.

The lecturer and researcher give motivation to the respondents on their efforts and help them to form knowledge towards comprehension by providing critical and effective comments. Besides that, the respondents are also involved in self-regulation and reflection where smart respondents correct the errors based on the comments provided. Thus, through Figure 2, several elements of meaningful learning – active and constructive learning – are achieved.

Figure 3 shows the interaction of one of the respondents with the researcher through Twitter. Based on the figure, active learning occurs as the result from active interaction with the researcher and from to-and-fro feedbacks given. The respondents have successfully associated new knowledge with the existing experience. The respondents have also successfully formed knowledge transfer and used creative and critical thinking skills by posing questions and opinions. Respondents' participation in discussing an idea with other respondents and facilitators is one of the elements of personalized learning. Through the interactions in Twitter, the respondents have achieved meaningful learning based on active learning formed. In the integration of Web technology 2.0 in T&L, twitter allows each post to be published and shared in Facebook and WordPress.

Figure 4 depicts a section of a WordPress blog of one of the respondents that reflects on learning. Reflection written by the respondents formed objective learning due to their action in following through all plans and objectives set. Besides that, authentic learning is also formed through reflection because it is written authentically based on the experience faced by the respondents. Learning becomes more meaningful when it is applied to the real life situation. Personalized learning through WordPress has successfully formed strategic learning. Learning is more effective when the respondents use effective strategies in writing the reflections that require them to make evaluation, analysis and conclusion. In addition, the respondents have associated new information with the existing information based on the reflections that they have written in the WordPress blog. Learning will be better if the instructors acknowledge the individual differences, learning styles and multiple intelligences of the students. Therefore, by integrating WordPress and other technology tools in a personalized learning environment, meaningful learning can be achieved.

Figure 5 shows a snapshot of a video uploaded by one of the respondents to YouTube. By such actions, constructive and cooperative learning is achieved in a personalized learning environment. The respondents involved in preparing the video have fulfilled a meaningful activity which is one of the elements of personalized learning. The respondents are able to learn better when they take part in each activity deemed useful in real life situations and if it is related to a certain culture. The duration given to the respondents in producing a video of high quality was sufficient. Therefore, it can be concluded that YouTube offers a lot of assistance to the students in video production and presentation, and indirectly form active, constructive and cooperative learning in a personalized learning environment. YouTube can also be used together with Facebook in video publishing and sharing among the respondents and the lecturer. Furthermore, YouTube also assists the respondents in presenting their video assignment by using Prezi and PowerPoint. WordPress also allows videos from YouTube to be published in the respondents' blog.

Finally, Figures 6 and 7 show snapshots of PowerPoint and Prezi presentation slides prepared by the respondents for their final presentation. The respondents used the slide presentation to convey information, ideas and videos. The respondents integrated several technology tools such as YouTube into their slide presentation. Other than YouTube, Facebook, Twitter and WordPress can also be displayed in the slide presentation by including the link to the URL. Construction and cooperation happen when the students use applications for presentation. The respondents constructed and conveyed clear information through PowerPoint or Prezi in groups. This helps the respondents to compare the information given in just one slide. Besides that, this depicts strong self-efficacy of the respondents as shown in Figures 6 and 7, and this is in line with the findings from a study conducted by Špernjak (2014). In addition, the respondents are able to comprehend a concept better through visual presentation in PowerPoint or Prezi rather than to memorize facts only. Therefore, it can be concluded that PowerPoint or Prezi may be used to assist the students in the T&L process through personalized learning environment in achieving meaningful learning.



Figure 2. Facebook



Figure 3. Twitter

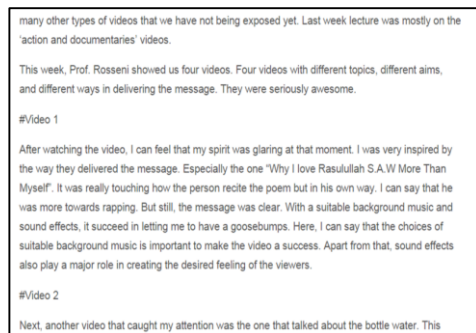


Figure 4. WordPress



Figure 5. YouTube



Figure 6. PowerPoint Slide

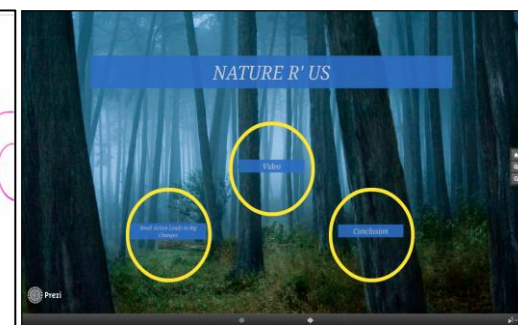


Figure 7. Prezi Slide

Table 3 indicates the association between Web technology 2.0 and attributes of meaningful learning with the elements of personalized learning. This information is tabulated based on observation, assessment and document interpretation related to Web technology 2.0. In integrating Web technology 2.0 into T&L, the elements of personalized learning have to be taken into account in order to achieve meaningful learning.

Based on the information stated in Table 3, all elements of personalized learning were implemented in the integration of Web technology 2.0. Similarly with the five attributes of meaningful learning that were achieved through the use of Facebook, WordPress, Twitter, YouTube, and PowerPoint or Prezi. Therefore, it can be concluded that the integration of Web technology 2.0 supported by the elements of personalized learning can achieve meaningful learning.

Table 3. Association between Web technology 2.0, Elements of Personalized Learning with the Attributes of Meaningful Learning

Web Technology 2.0	Elements of Personalized Learning	Attributes of Meaningful Learning
Facebook (Facebook Group)	Active participation Redesigning knowledge Produce motivated students Towards comprehension (not memorization) Involvement of self-regulation and reflective Social participation	Active Constructive
WordPress	Strategic Assisting the students in knowledge transfer Formation of individual differences Associating new information with the existing information	Authentic Objective
YouTube	Meaningful activities Social participation Providing adequate duration for training	Constructive Cooperative
Twitter	Active participation Social participation	Active
PowerPoint/Prezi	Towards comprehension (not memorization)	Constructive Cooperative

Document Analysis and Visual Methods based on the Assignment or Project

Figure 8 shows the reflection written in the blogs of two respondents. The reflections were written at the end of each T&L session so that the students could actively associate new information with the existing experience. Through reflection, the students were able to create new learning and put forth original and brilliant ideas thus contributed towards the achievement of constructive, active and authentic learning among the respondents. The findings of this study are in line with the study conducted by Carroll et al. (2006) which stated that reflections in blog is one of the components of personalized learning environments and one of the educational development tools. Therefore, it can be concluded that reflection helps students and teachers to evaluate the T&L conducted and thus improves the materials and lesson design in improving the quality of T&L.



Figure 8. Students' Reflections

Figure 9 shows the working paper prepared by one of the groups of respondents. The paper was written to evaluate if the topic chosen fulfills the requirement of producing an original working paper. Besides that, the working papers were assessed by the lecturer and facilitators before the students proceeded with developing storyboards, posters and videos. Through the document as shown in Figure 9, the respondents stated the objective of the working papers, target audience, flow chart of the video preparation and the script used in the video.

ORGAN DONATION : HAVE A HEART? GIVE A PART... by : GG Creation	
Overview The purpose of this video is to create an awareness among the people about the importance of the organ donation. People should realise that by donating organs, they can save many lives even after they passed away.	
Audience The audience targeted for this video is everyone who are eligible to donate their organ regardless of their age, race, religion and nationality.	
SCRIPT	
Topic : Organ Donation	Target audience : Everyone who are eligible to donate their organ.
Segment : Audio selection for each scenes	Duration :
Writer : Syakirah & Jannah	Date : 10/10/2013

Figure 9. Working Paper

The attributes to meaningful learning achieved through the preparation of the working papers are cooperative, active, constructive, objective and authentic learning. Cooperative learning occurred during the group discussion meanwhile constructive learning took place when the respondents were able to form a plan, state the target audience and produce flow charts and scripts for the video. Active learning happened indirectly. Furthermore, objective learning took place when the respondents successfully implemented the plans proposed in the working papers based on the objectives stated. Lastly, authentic learning happened when the respondents prepared an original working paper in addition to solve any issue. This shows that the preparation of working papers within a personalized learning environment can help to achieve the five attributes of meaningful learning.

Figure 10 shows one of the storyboards produced by the respondents. Once the working papers were approved by the lecturer and facilitators, the respondents were required to prepare storyboards to illustrate the plan or story flow to be followed by the respondents throughout the process of producing the videos and posters. In other words, the storyboards were also used as guidelines to prepare the videos required

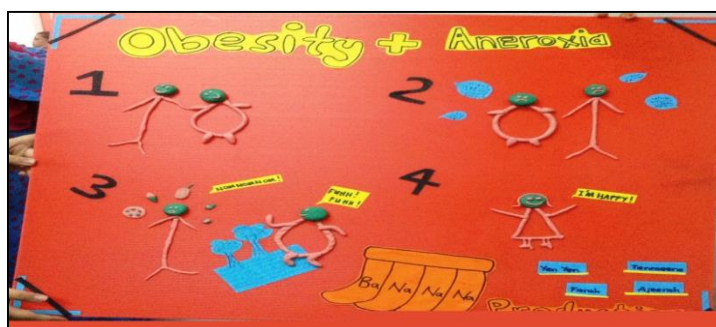


Figure 10. Storyboard

Some of the elements of personalized learning which were successfully instilled in T&L through this activity were (i) students' active participation, (ii) social participation, and (iii) constructing meaningful activity. Students' active learning happened while the respondents worked in groups to produce a storyboard in the classroom. Social participation was achieved when the respondents worked together in producing and presenting the storyboards in one-on-one T&L sessions. Meaningful activity was achieved when the students took part in the production of the storyboards. According to Husnin et al. (2013), storyboard is one of the assignments that promote authentic learning. Indirectly, all five attributes of meaningful learning were achieved through the production of the storyboards.

Poster is one of the tools which assists communication. Compared to lectures, a poster is more effective in conveying information (Ceruti, 2000). In this study, the respondents were asked to produce a poster to help them present their video project. Figure 11 displays two examples of the posters prepared by the respondents. In Figure 11, the posters shown clearly demonstrate that the respondents have mastered authentic learning by producing original products. The posters created indicate solutions to certain issues in daily life. Objective learning was achieved too due to the formation of new information from the use of the existing information based on the aims set. For example, the production of authentic posters as stated in the working papers. The posters were also produced based on the theme of the assignment given. In addition, constructive learning was also achieved through the construction of new information from the existing knowledge of the respondents. This matter is in line with the study conducted by Kitto (2008) which stated that posters may form an understanding of a concept among the respondents and the respondents may articulate their assignment through posters. Besides, the tasks assigned to the respondents were strategic and encouraged the increase of motivation among the respondents. Therefore, poster production by using Web technology 2.0 tools can be implemented fully in a personalized learning environment thus enabling meaningful learning to be achieved.



Figure 11. Posters

Figure 12 is the snapshots of one of the videos published by the respondents. The videos produced were presented to the lecturer and facilitators in front of the classroom. Then, the videos produced were uploaded to YouTube. Figure 12 indicates that the respondents were able to produce documentary videos related to the environment. The respondents were also able to form an understanding and new ideas through the videos that they produced. It can be clearly seen that constructive and authentic learning took place in this process. Furthermore, objective learning was also achieved when the respondents were able to produce videos as planned on the storyboard. The personalized learning environment also played a part in assisting the respondents to produce meaningful activity and to participate actively in completing the tasks given. The respondents were able to practice self-regulation and reflection while completing the task together in groups. It can be concluded that the video assignment produced in this study through a personalized learning environment has successfully achieved meaningful learning.



Figure 12. Snapshots of the Videos

Table 4 shows the attributes of meaningful learning achieved by the respondents through project assignment in this study. Based on Table 4, the findings of document analysis and visual methods used in this study show that the attributes of meaningful learning were successfully achieved. Even though some of the tasks such as reflection, poster and video show no relation to any association with the attributes of meaningful learning, but the associations developed in this study are acceptable as all tasks are the division on one main project for the GE2153 course. Furthermore, according to Jonassen (1995), the attributes of meaningful learning are interdependent. At least three of the attributes have to be dependant to one another. In this study, tasks such as reflection, poster and video have achieved at least three of the attributes of meaningful respectively. This means that the T&L experienced by the respondents has achieved meaningful learning.

Table 4. Attributes of Meaningful Learning Achieved through Project Assignment

Attributes/Tasks	Reflection	Working Paper	Storyboard	Poster	Video
Active	√	√	√		
Constructive	√	√	√	√	√
Cooperative		√	√		
Authentic	√	√	√	√	√
Objective		√	√	√	√

CONCLUSION

The advancement of Web technology 2.0 is ever changing and has been identified to support T&L. Technology and Web 2.0 can be integrated in T&L in a suitable environment by conducting concrete and related activities. Only suitable, free and accessible technologies are chosen to be fully utilized in personalized learning environment. Through this study, Web technology 2.0 was integrated in T&L to support a personalized learning environment. Furthermore, the Web technology 2.0 integrated into a personalized learning environment may achieve all five attributes of meaningful learning which are constructive, cooperative, active, authentic, and objective learning. In addition, the Web technology 2.0 used has successfully integrated almost all of the elements of personalized learning. By instilling POPEye strategy in T&L, the use of Web technology 2.0 can be fully utilized. Further studies are suggested so that the higher education institutes can fully utilize Web technology 2.0 in personalized learning environments and to implement a POPEye teaching strategy in achieving meaningful learning. Thus, this study hopes to give a significant impact on the education system in Malaysia in improving the quality of T&L in line with the advancement of technology so that the aspiration of the nation in producing competent students may be achieved.

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