Implementation of Ptechls Modules in Rural Malaysian Secondary School: A Needs Analysis

Norlidah Alias [1], Dorothy DeWitt [2], Saedah Siraj [3], Mohd Nazri Abdul Rahman [4], Rashidah Begum Gelamdin [5], Rose Amnah Abd Rauf [6]

[1] drnorlidah@um.edu.my
Department of Curriculum & Educational Technology, Faculty of Education,
University of Malaya, Kuala Lumpur, Malaysia.

[2] dorothy@um.edu.my
Department of Curriculum & Educational Technology, Faculty of Education,
University of Malaya, Kuala Lumpur, Malaysia.

[3] armnazri@yahoo.com
Department of Curriculum & Educational Technology, Faculty of Education,
University of Malaya, Kuala Lumpur, Malaysia.

[5] rashidahbegumgelamdin68@yahoo.com
Department of Curriculum & Educational Technology, Faculty of Education,
University of Malaya, Kuala Lumpur, Malaysia.

[6] rose_amnah@um.edu.my
Department of Curriculum & Educational Technology, Faculty of Education,
University of Malaya, Kuala Lumpur, Malaysia.

ABSTRACT

Research has shown that the strategy of matching learning style with certain technology enhances students' learning experience. This study seeks to identify the learning styles among students in a rural secondary school, based on the Felder Silverman Model (1988) which comprises four dimensions (visual/verbal, active/reflective, sequential/global, sensing/intuitive). A PTechLS module developed by Norlidah Alias (2010) will be implemented in secondary school. The main objective of this study is to analyze the needs for a pedagogical module based on technology and learning style (PTechLS) for the Form 4 Physics curriculum before the implementation. Data were collected through surveys among 47 students in a rural secondary school in the Jempol district in Negeri Sembilan. Two instruments were used: learning style instrument and computer skills and usage questionnaire. From the learning style instrument, most of the students were identified as active (89.3%), reflective (10.7%), sensing (78.7%), intuitive (21.3%), visual (95.7%), verbal (4.3%), sequential (70.2%) and global (29.8%) learners. The computer skills and usage questionnaire shows that students in the selected rural school have access to technology and are already using it for learning. Therefore, the researchers suggest the implementation of PTechLS modules among rural Malaysian secondary schools.

Keywords: *PTechLS, Physics Curriculum, A needs Analysis*

INTRODUCTION

The strategy of matching learning style with certain technology enhances students learning experience (Norlidah Alias, 2010; Norlidah Alias & Saedah Siraj, 2012; Norlidah Alias, Dorothy DeWitt, & Saedah Siraj, 2013). Learning style defines how a learner concentrates, processes and retains information during learning (Dunn, 1990). Identifying a learner's unique learning style is important in ensuring that learners are engaged in learning (Graf, Kinshuk, & Liu, 2009; Larkin-Hein & Budny, 2001; Naimie, Siraj, Ahmad Abuzaid, & Shagholi, 2010; Yang & Tsai, 2008). It has been observed that when instruction is aligned with the learners' learning styles learning achievements will increase together with affective and motivational advantages (Aviles & Moreno, 2010; Franzoni & Assar, 2009; Lau & Yuen, 2010; Saeed, Yang, & Sinnapan, 2009).

Previous research shows that matching the Physics concept, technology and learning styles can increase the students' mastery of concepts (Hein, 1997; Ross & Lukow, 2004; Tsoi, Goh, & Chia, 2005). A Physics pedagogical module based on learning style and appropriate technology (PtechLS) was developed by Norlidah Alias (2010) to enhance the learning of abstract concepts in Physics by matching learning style and appropriate technology. The module was later experimented among 120 urban students in the Klang Valley of Malaysia (Norlidah Alias & Saedah Siraj, 2012) involving 30 participants of each learning style (visual/verbal, active/reflective). The results of the study suggested that the module is effective for visual, active, reflective and not for verbal learners. The researchers also compared the module effectiveness

according to gender. The verbal and reflective modules were effective for female learners and not for male learners. The module was later extended to other science subjects such as Biology and Chemistry and further will be implemented in a rural school in Negeri Sembilan. Before implementing thePTechLS modules, a needs analysis was conducted to analyse the needs for a PTechLS among the rural school students in the context of the study.

The Aim of Research

The aim of this research is to analyse the needs of the PTechLS among the students in the rural school in the context of the study. In order to achieve this aim, the researcher set two research objectives. The first objective is to identify the learning styles of the students in the rural school in the context of the study. The second objective of this research is to identify the computer skills and usage of the students in the rural school in the context of the study. This study seeks to answer the following research questions:

- What are the learning styles of the students in the rural school in the context of the study?
- What are the technology tools which students in the rural school in the context of the study accessed?
- What are the technology skills of the students in the rural school in the context of the study?

Scope and Limitations

In this study, a sample size of 47 students at a rural secondary school in the state of Negeri Sembilan was selected as the population reflected the proportion of the Malay community in Malaysia.

INSTRUMENTS

Two instruments were used in this study: First is the Index of Learning Styles (ILS) (Felder & Silverman, 1988) for identifying the students' learning styles. The survey instrument used was the Learning Style Index (LSI) developed by Felder and Soloman (1988) which had been translated into Bahasa Malaysia by Nabihah Badar and Saedah Siraj (2005) and administrated to 120 Form Four students in the Klang district. The instrument has a Cronbach alpha reliability score of .72.

The second instrument is the Technology Skills and Usage Questionnaire (TechSU) which covers the students' access to technology equipment; the skills and usage of the students related to technology; and the perception of the use of computers and mobile phones for learning. The TechSU questionaire was adapted from the Computer Skills and Usage Questionnaire originally designed to determine teachers' and students' skills and use of computers based on the Smart School Teachers' Training Curriculum, Information Technology and Skills Curriculum and National Educational Technology Standards (Norizan Ahmad, 2005). The TechSU questionnaire took into account the latest trends and progress of technology as in the National Educational Technology Standards for Students (NETSS) (International Society for Technology in Education, 2005). The instrument used in this study was validated by three experts in education technology and had a high Cronbach alpha coefficient of .882 on the items for technology skills usage, and perceptions of use of technology in learning. The responses to the items were on a Likert scale of 1 to 4 ranging from 'never doing a particular item'; to 'frequently used, which is equivalent to using more than once a week' for frequency of use; and another scale of 1 to 4 ranging from 'no knowledge of a particular item'; to 'feels that the response is very true' for perception on the use of technology.

RESULTS AND DISCUSSION

The Learning Style of the Students

Table 1 displays the findings on the rural students' preferred learning styles.

Table 1: The learning style of the students in the rural school

Learning Style	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
4ST (n = 47)	89.3%	10.7%	78.7%	21.3%	95.7%	4.3%	70.2%	29.8%

Findings from survey conducted among 47 participants based on the learning style instrument suggested that most of the students in the rural school in the context of the study were identified as active (89.3%), reflective (10.7%), sensing (78.7%), intuitive (21.3%), visual (95.7%), verbal (4.3%), sequential (70.2%) and global (29.8%).

Table 2 shows the access to computers and mobile phones among the rural school students.

Table 2: The access to computers and mobile phones among students in the rural school

Equipment	No.	Percent (%)
Computer	34	73.8
Mobile Phone	14	29.8
Mobile Phone/ Tablet with internet	20	42.6

The survey using the TechSU questionaire showed that a large number of students had access to computers (73.8%), and mobile devices such as mobile phones and tablets (72.4%). Many had access to both computers and mobile devices. Most of the mobile devices accessed by the students could acces the internet (42.6%).The students also had access to other technology equipment such as VCD/DVD players (57.4%) and other portable audio players such as MP3 or iPods (21.3%).

Table 3 gives the frequency of basic technology operations among the rural students.

Table 3: The mean frequency of use of basic technology operations among students in the rural school

Basic technology operations	Mean	*S.D*
Writing reports using wordprocessing software (eg. MS Word)	1.4681	.77603
Input data in spreadsheet (eg. MS Excel)	1.4043	.64806
Drawing graphs using spreadsheet (eg. MS Excel)	1.4468	.80240
Printing documents with a printer	1.7447	.84617
Using a scanner or digital camera	2.0213	1.11295

Nota: 1: Never 2: Once in 2-3 months 3: Once a month 4: Once a week or more

The basic operations which were most used are scanning and using digital cameras (Mean = 2.0213. *S.D.*=1.11295) and printing documents using a printer (Mean = 1.7447, *S.D.* =0.84617)

Next, Table 4 shows the frequency of yechnology usage for problem solving among the rural students in the study.

Table 4: The mean frequency of use of technology for problem solving among students in the rural school

Techology for problem solving	Mean	*S.D*
Obtaining information from CD-ROM (reference or courseware)	1.4681	.77603
Obtaining information from search engines such as Yahoo or Google	2.6383	1.30926
Evaluating validity of information obtained from the internet	2.2340	1.25478
Using graphical management software	1.7660	1.06756
Using concept mapping software	1.4681	.77603

Nota: 1: Never 2: Once in 2-3 months 3 Once a month 4: Once a week or more

The technology most used for problem-solving is the internet as the students frequently use it to obtain information (Mean = 2.6383, *S.D*. =1.30926) and evaluate the validity of the information (Mean = 2.2340. *S.D*. =1.25478).

Table 5 gives the mean for frequency in using communication tools among the rural students surveyed.

Table 5: The mean frequency of use of communication tools among students in the rural school

Communication tool	Mean	*S.D*
Sending e-mails to other students or friends peers regarding school work	1.6596	1.00599
Receiving information regarding school work through e-mails from peers or experts	1.7447	1.09282
Sending and receiving information from peers or experts through on-line discussions (bulletin board, newsgroup, Yahoo messenger, blogging)	2.5106	1.19550
Sharing information with peers or experts through on-line discussions (bulletin board, newsgroup, Yahoo messenger)	2.2979	1.17797
Having discussions and exchange of data among peers and experts through on-line discussions	2.1064	1.22002

Nota: 1: Never 2: Once in 2-3 months 3 Once a month 4: Once a week or more

Communication tools are used for sending and receiving information (Mean = 2.5106, *S.D.* =1.19550), sharing information (Mean = 2.2979, *S.D*. = 1.17797) and discuss among peers and experts (Mean = 2.1064. *S.D*.=1.2002).

The students frequently use basic technology tools such as scanners, digital cameras and printers as well as search engines. In addition, communication tools for sharing information and discussions were also frequently used.

The data indicates that social applications which provided for interaction and communication is frequently used among students in the rural school. This is further verified as a majority of students were able to access computers and have mobile devices which could access the internet.

Hence, there is a possibility of employing tools for communication online for instruction. These tools could be used to cater to specific learning styles. Communication tools which can be employed for specific learning styles, according to experts in a Delphi study indicate the following: Web quests, and microblogs such as Facebook and Twitter can be used as digital resources for active learners, while courseware, audios and video clips for reflective learners (Norlidah Alias, DeWitt, & Saedah Siraj, 2013). Visual learners prefer video clips, courseware and social media as learning resources, while verbal learners in addition prefer video conferencing, webquest, audio recordings, and specifically Facebook and Twitter as social media (Norlidah Alias et al., 2013). Most of the learners use social media, and access the internet for resources. This is reflected by the technology tools used most frequently by the learners, namely communication tools and the internet.

IMPLICATION AND CONCLUSIONS

This paper has described an effort to identify the needs of PTechLS modules among students in the Malaysian rural secondary educational setting by identifying the students employing the Isman model. The needs were addressed by identifying the learning styles, the computer skills and usage of the students in the rural school in the context of the study. From the learning style instrument, most of the students were identified as visual (95.7%), sensing (78.7%), active (89.3%) and sequential (70.2%). The computer skills and usage questionnaire shows that students in the selected rural school have access to technology and are already using it for learning and social interaction using the internet. Therefore, the researchers suggest the implementation of PTechLS modules among rural Malaysian secondary schools.

The impact of the project will be that matching the learning style of the student to the activities using the appropriate technology tools will benefit the students. During the project implementation, the teachers were made aware of the concept of learning styles and specifically the preferred learning styles of students in their classes. Discussion was conducted among the teachers on how to address the different learning styles during face to face activities in the classroom. This awareness will assist teachers in designing activities which will address individual learning styles.

The impact of this project will be on the implementation of technology use for the apporpriate learning style. The students will be able to utilise ICT for learning according to their individual learning style. This will be conducted in the next phase of the study.

ACKNOWLEDGEMENT

Funding of this research work is generously supported by the Knowledge Transfer Grant (KTP07-2012B), Ministry of Education Malaya, Malaysia.

REFERENCES

Aviles, R. M. H., & Moreno, A. H. (2010). Creating the conditions for educational change: Learning styles and gender. *International Journal of Learning and Change*, *4*(3), 252-262.

Dunn, R. (1990). Understanding the Dunn and Dunn Learning Styles Model and the need for individual diagnosis and prescription. *Reading, Writing and Learning Disabilities*, *6*, 223-247.

Franzoni, A. N., & Assar, S. (2009). Student Learning Styles Adaptation Method based on teaching strategies and electronic media. *Educational Technology & Society*, *12*(4), 15-29.

Graf, S., Kinshuk, & Liu, T.-C. (2009). Supporting teachers in identifying students' learning style in Learning Management System: An automatic student modelling approach. *Educational Technology & Society, 12*(4), 3-14.

Hein, T. L. (1997). *Digital video, learning styles and students understanding of kinematics graph*. Doctoral thesis, Kansas State University.

Larkin-Hein, T., & Budny, D. D. (2001). Research on learning style: Applications in the physics and engineering classrooms. *IEEE Transactions on Education, 44*(3), 276–281.

Lau, W. W. F, & Yuen, H. K. (2010). Promoting conceptual change of learning sorting algorithm through the diagnosis of mental models: The effects of gender and learning styles. *Computers & Education, 54*, 275-288.

Norlidah Alias. (2010). *Pembangunan Modul Pedagogi Berasaskan Teknologi dan Gaya Pembelajaran Felder-Silverman Kurikulum Fizik Sekolah Menengah.* [Development of pedagogical Module Based on Technology and Learning Style for Secondary School Physics Curriculum] Unpublished doctoral thesis, University of Malaya.

Norlidah Alias & Saeddah Siraj. (2012, October). Design and development of Physics Module based on Learning Style and Appropriate Technology by employing Isman Instructional Design Model. *TOJET: The Turkish Online Journal of Educational Technology, 12*(4).

Norlidah Alias, Dorothy DeWitt & Saedah Siraj (2013). *Development of Science Pedagogical Module based on learning styles and technology.* Kuala Lumpur: Pearson Malaysia.

Naimie, Z., Siraj, S., Ahmad Abuzaid, R., & Shagholi, R. (2010, October). Hypothesized Learners' Technology Preferences based on Learning Style Dimensions. *TOJET: The Turkish Online Journal of Educational Technology, 9*(4).

Ross, C. M., & Lukow, J. E. (2004). Are learning styles a good predictor for integrating instructional technology into a curriculum? *Journal of Scholarship of Teaching and Learning 4*(1). Retrieved from http://www.iupui.edu/~josotl/2004vol4no1/RossLukow.pdf

Saedah Siraj, & Nabihah Badar. (2005). Malaysian secondary students' preference in learning Physics: Implication to the teaching strategies. *The International Journal of Learning,* 10, 3559-3572. Retrieved from http://www.Learning-Journal.com

Saeed, N., Yang, Y., & Sinnapan, S. (2009). Emerging Web technologies in Higher Education. A case of incorporating blogs, podcasts and social bookmarks in a Web Programming Course based on students' learning styles and technology preferences. *Educational Technology & Society, 12*(4), 98-109.

Yang, F.-Y., & Tsai, C.-C. (2008). Investigating university student preferences and beliefs about learning in the Web-based context. *Computers and Education, 50*(4), 1284-1303.

Tsoi, M. F., Goh, N. K., & Chia, L. S. (2005). Multimedia learning design pedagogy: A hybrid learning model. *US-China Education Review, 2*(9), 59-62.