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Online resource-based learning environment: Case studies in primary classrooms

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Abstract
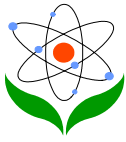
This paper discusses the creation of learning environments with online resources by three primary school teachers for pupil's learning of science-related topics with reference to the resource-based e-learning environments (RBeLEs) framework. Teachers' choice of contexts, resources, tools, and scaffolds in designing the learning environments are identified by content analysis of the teaching designs. The rationale behind teachers' choices and the reflection on lesson implementations

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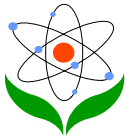Online resource-based learning environment: Case studies in primary classrooms

are drawn from the post-lesson interview with the three teachers while pupils' opinions about learning in the RBeLEs are probed in the post-lesson interview with the focus groups. The findings show that the RBeLEs framework has facilitated the teachers to design learning environments with online resources; they become more aware of how the online resources should be selected and used, and the scaffolds needed to be provided to support pupil learning. It is also revealed from the interviews that learning in the RBeLEs is in general motivating and interesting to the pupils, yet the challenges faced by pupils while interacting with the online resources warrant our attention. Suggestions for further research regarding the RBeLEs are also provided.

Keywords: Online resources; learning environments; resource-based learning

Introduction

As well as many other areas around the globe, Hong Kong is actively advocating the use of technology to support pupil learning. Ever since the Internet became visible to the general public in the early 1990s, its application and penetration have been on an increase. By January 2011, the rate of household broadband penetration rate in Hong Kong is 82.9% (OFTA, 2011). Primary school children today are natives of the digital generation whose lives are largely filled by technology; they can use technology with ease. Indeed, Mitra's (2001) most famous "Hole-in-the-wall" experiments showed that basic computing skills can be picked up by the child on their own. However, research reminds us that if technology is given to children without an educational context it in fact damages learning (Becta, 2009).

A decade ago, Marshall (2002) found strong evidence that educational technology "complements what a great teacher does naturally". Over the years, there has been a large body of evidence that supports the positive association between the use of technology and learning outcomes from the perspectives of both teachers and learners. There is little doubt that the emergence of the Internet has transformed almost every aspect of our lives. The online digital world has also changed the way learning and teaching takes place. Moreover, the Internet has allowed access to all sorts of different information in no time. Constant access to such information resources has also becoming an expectation that children bring to their school learning (Becta, 2009). In a review of Internet-based science learning environments

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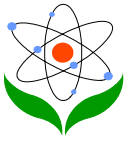Online resource-based learning environment: Case studies in primary classrooms

(ISLEs), Lee et al. (2011) concluded that ISLEs, in general, improved pupil learning outcomes such as attitude, motivation, conceptual understanding, and conceptual change.

Many teachers, having heard of the benefits of the Internet for education, have tried to include the use of online resources in their teaching. Unfortunately, there is no evidence that these resources are used both widely and wisely (Education Bureau, 2007). Resources are picked from the Internet haphazardly without much consideration of the appropriateness and how the resources should be used in coordination with the other components of the learning environments to promote pupil learning. Research studies showed that most teachers failed to make use of the potential of information and communication technology to contribute to powerful learning environments (Smeets, 2005) and that educational technology research is often delinked from authentic practice (Winn, 2002). The foci of educational technologies have shifted (Winn, 2002)—they no longer emphasise on content, format and interaction, but on creating learning environments. Hence, a Resource-based e-Learning Environments (RBeLEs) framework has been proposed to help teachers create learning environments with online resources more effectively (So, 2012).

The RBeLEs framework is derived mainly from the discussions of resource-based learning environments (Hill & Hannafin, 2001) and learning sciences-based learning environments (Blumenfeld, Kempler, & Krajcik, 2006). It comprises four components: creation of contexts, selection of resources, use of tools and adoption of scaffolds. Contexts are setting in which understanding develops; resources include the core information presented in the learning environments; tools are aid in information processing, searching and seeking, information and data collection, organising, collaborating and integrating, and communicating; scaffolds can be in the forms of asking and discussing, searching and selecting, doing and observing, and summarising and conceptualising. These four components work together to form meaningful learning environments that are conducive to pupil learning with online resources.

This study aims to evaluate, preliminarily, whether the RBeLEs framework is helpful for teachers in the design of learning environments for pupils to learn with online resources, and to find out how pupils feel about learning in such learning environments. These understandings will also help direct future research concerning the RBeLEs framework.

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Methodology

As a preliminary study of teachers' use of RBeLEs to create learning environments, the cases of three primary teachers (Teacher A, Teacher B and Teacher C) and their upper primary classes consisting 26-30 pupils were involved. The teachers had experience in using online resources to teach and were introduced the RBeLEs framework at a one-hour workshop held by the researcher.

With reference to the framework, each of the teachers created a 90-minute science-related lesson. Teacher A created "Climate in China"(T01), Teacher B "Connection and movements of bones"(T02), and Teacher C "Hong Kong climate"(T03). Except the lesson by Teacher A was conducted in a computer laboratory where each pupil used one desktop computer, the other two lessons were conducted in ordinary classrooms where pupils sat in groups of 3-4 and shared one notebook computer.
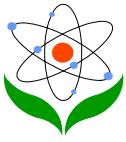
Content analysis of the teaching designs were conducted to identify teachers' choices for each component of the RBeLEs. The underpinning rationale and the post-lesson reflection on the designs by the teachers were captured by interviews with the teachers and pupils' feelings about learning in the RBeLEs from post-lesson interviews with individual pupils in the focus groups. All interviews sessions were semi-structured, audio-recorded, and later transcribed and analysed.

Results

1. Creation of contexts

Contexts are real or virtual setting in which learners develop understanding. From the analyses of the teaching designs, it was discovered that all the contexts were determined by the teachers according to the curriculum and textbooks. None were pupil-determined or negotiated. Only Teacher C had incorporated some current issues in the context. She explained her rationale,

> The textbook doesn't go deep into the topic of global warming but I believe this issue is directly related to the pupils so I arranged a session to investigate it with the pupils. (Teacher C)

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The teachers believed that the contexts they determined were of an appropriate level to the pupils. For example,

> The lesson went on as planned. I was worried about not having enough guidelines but the pupils turned out to be able to master the skills during inquiry. (Teacher B)

In general, the pupils found the learning topics interesting despite some challenges they had encountered while interacting with the online resources and completing the learning activities.

2. Selection of resources

Online resources lie at the heart of the RBeLEs framework. Content analyses of the teaching designs showed that Teacher A and Teacher C used both dynamic and static resources from different sources, from government bodies to non-governmental organisations and from business corporations to educational organisations.
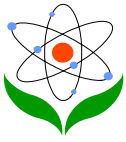
> Most of the resources are dynamic because weather information changes all the time. (Teacher A)

> I selected both dynamic and static resources for this topic. The weather news video, for example, is considered to be dynamic since it's updated twice a day. Others such as text and data are static, I think. (Teacher C)

Teacher B used only static resources ' videos. She talked about her choice of resources during the interview.

> I would like pupils to understand how the bones inside the body can be seen, for example, with X-rays, and how the bones are connected. I think the videos I found on the Internet can show these things to the pupils clearly. (Teacher B)

All the teachers said that based on their observations, the online resources were able to raise pupils' interest in learning. However, the teachers had also observed some difficulties encountered by the pupils when dealing with the online resources. For example,

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> The pupils found it difficult and confusing to switch between different websites. They expected to find all the information needed from one website. (Teacher A)

> I thought they [the pupils] could learn by just watching the videos and simply ignoring the English or Putonghua voice-overs. But, I ended up having to give them more time to watch the videos because they kept telling me that they couldn't understand. (Teacher B)

The pupils in the classes of Teacher A and Teacher B mentioned the difficulties they encountered while using the online resources, which were similar to those observed by the teachers. For example,

> We didn't know where to find the weather information of different cities in China. (Student_A02)

> We didn't know we had to look for the information from different websites until the teacher told us. (Student_A05)

> The video [about the connection of bones] was in English, I couldn't understand it. (Student_B02)

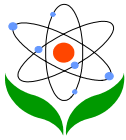Moreover, Teacher C expressed difficulty in finding suitable online resources for the topic. She said,

Many of the resources I found were in English or Simplified Chinese; even if the content was appropriate pupils would find it hard to read. Some videos I found were also not in Cantonese, pupils would not understand. (Teacher C)

3. Use of tools

To foster pupils' learning, the teachers adopted different tools for various tasks, including tools for processing information, searching and seeking, collecting information and data, organising, collaborating and integrating, and communicating.

Information processing

It was shown from the content analyses that all the teachers used printed worksheets as tools to support pupils in processing information. Discussion

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questions and spaces for recording information, writing down answers and composing drawings were included in the worksheets. Teacher B said,

> Worksheets can help students integrate what they have learned from the online resources.

Searching and seeking

All the three teachers provided specific websites or videos for the pupils to look for the information needed, except Teacher A, who also asked his pupils to look for the altitudes of different Chinese cities using Google Maps. Teacher A described how the activity went during the interview,

> Each group of pupils had to look for the altitudes of several cities in China with Google Maps and by comparing these altitudes they tried to explain why the cities from different parts of China show different weather patterns. (Teacher A)
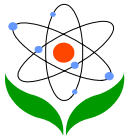
Information and data collecting

Among the three teachers, only Teacher B planned a learning activity that involved pupils using the integrated webcam of the notebook computer to record a short video of their inquiry experiment. The video was later uploaded to an online video sharing platform so that pupils could watch the inquiry experiment done by different groups. Neither did the teacher observe nor did the pupils mention having difficulty in video shooting. Teacher B said,

> The pupils have experience of using the video shooting function of the notebook computer so it wasn't a problem for them except the shooting time was a bit longer than expected. (Teacher B)

Organising

Teacher C helped pupils to organise their ideas by asking them to create concept maps on paper. By comparing the concept maps drawn by pupils before and after learning, changes in pupils' learning could be made explicit to the teacher. Besides, drawing concept maps allows pupils to think about, organise and visualise ideas and their connections, and reflect on their understanding (Vanides, Tomita, & Ruiz-Primo, 2005).

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Collaborating and integrating

In Teacher B's class, the teacher designed two activities that required pupils to work together and connect their existing and newly gained understanding. In the first activity, the pupils were asked to complete a skeleton puzzle in groups by matching different parts of the human skeleton to their functions. The completed puzzle was an artefact that represented pupils' understanding. In the second activity, the pupils worked in groups to make a model of the elbow joint with the materials provided by the teacher and record a short video to show their model and how the two pieces of bones were connected and how movements were allowed. At the interviews, the pupils talked about the difficulties they experienced when creating the model. For example,

> We didn't know which materials we should use and how to connect the bones to one another. (Student_B04)

> The experiment was very difficult. We tried to tie the bones with rubber bands, we used a lot of them but it didn't work. (Student_B07)

Communicating

From a social constructivist point of view of learning, understanding is socially constructed through dialogical processes. In this study, all the teachers provided opportunities for pupils to communicate within groups, between groups and with the teacher. Both individual and group presentations were used by the teachers. Apart from face-to-face communication, Teacher B also had the videos produced by different pupil groups uploaded to an online video platform for sharing.
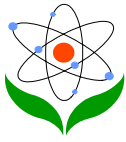
4. Adoption of scaffolds

As evident from the interviews and content analyses, different types of scaffolds were designed and adopted to support pupils in asking and discussion, searching and selecting, doing and observing, and summarising and conceptualising while learning in the RBeLEs.

Asking and discussion

Questions were used extensively by all the three teachers. There were questions printed on the worksheets to guide pupil inquiry and discussion, there were also

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questions asked orally by the teachers to probe pupils' existing knowledge and stimulate pupil thinking. Major guidelines for learning activities were also found on the worksheets while more detailed instructions were given by the teachers during the lesson to the entire class or to individual groups or pupils.

Searching and selecting

Being able to search and select appropriate information from the Internet is one of the important and essential skills that pupils of the 21st century should possess. However, the pupils involved in this study were still relatively young and their Internet searching skills were not very well-developed. Therefore, to avoid pupils from being diverted to irrelevant information, all the teachers limited pupils' search of information to the designated online resources they considered relevant and appropriate. Clear instructions were also given so pupils knew exactly what they had to look for from the online resources. Yet, as aforementioned, some pupils found searching for information from the online resources challenging.
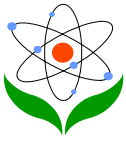
Doing and observing

The process of searching and selecting information by itself would not lead to learning unless pupils actually study and work with the information. It is shown from the content analyses and teacher interview that the three teachers required pupils to observe, read and study the information from the online resources and work on the information to construct understanding. As for "doing" the pupils in Teacher B's class carried out a hands-on modelling experiment after watching several online videos that described the structures and movements of joints.

Summarising and conceptualising

All the teachers involved in this study acknowledge the importance of summarising and conceptualising in supporting pupils to consolidate their understandings. For different sections of the lesson, the teachers helped pupils to summarise and conceptualise with different methods, such as fill-in-the-blanks, question-and-answer, multiple choice questions, drawing, and group discussion. And with these methods, the pupils worked on tasks like decision making, model creation and categorisation by applying their newly gained understanding.

Conclusion

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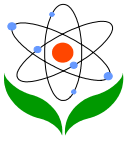
As revealed from the interviews and content analyses, the teachers had given careful consideration to selecting online resources. Not only did the teachers give deeper thought to how the online resources could be used to promote pupils'learning, but they also matched the resources with appropriate tools for information or data manipulation and took into account the scaffolds needed. This confirms the framework's role and purpose in supporting teachers to design lessons with online resources, helping teachers to link authentic practices to educational technology research. Differences shown in the teachers'attempts to design learning environments with online resources for the three science-related topics also seemed to suggest that the RBeLEs framework could be flexibly implemented. Further study on the applicability of the framework such as across grade levels and subjects is recommended. It would also be meaningful to study the range of learning outcomes brought about by the implementation of the RBeLEs.

Results of the pupil interviews indicated that the pupils were generally in favour of learning with online resources, saying that the lessons were made more interesting. Nevertheless, challenges in interacting with the online resources and using the tools were also mentioned, such as failing to locate the information needed. The teachers also admitted that they had over-estimated pupils' ability in handling the online resources and make meaning out of the information or data collected. These findings warrant attention to both the extent of scaffolds needed and the level of resources and tools selected, reminding teachers to take into consideration pupils' information and communication technology capacity when designing learning activities with online resources. Moreover, though the use of online resources were reported to be motivating, a systematic measure of pupils' motivation and cognitive engagement in the RBeLEs with a representative sample size would be helpful in evaluating the effectiveness of the RBeLEs in promoting learning.

Acknowledgements

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