Bridging between information literacy and information technology in Singapore schools: An exploratory study

Intan Azura Mokhtar*, Schubert Foo and Shaheen Majid
Nanyang Technological University, Singapore

Abstract

With rapid developments in information technology (IT) and the increasingly sophisticated abilities of IT users, schools have the inevitable task of integrating IT in their school curriculum. Due to prevalent use of educational technology in schools, it is often questioned whether information literacy is necessary in the school curriculum, especially when it is widely perceived that information technology literacy is equivalent to information literacy (IL). This paper gives an overview of IT initiatives as well as IL strategies that have been implemented in Singapore schools, and addresses the gaps that exist in the Singapore school education system in assimilating these two areas. Based on exploratory interviews with practitioners and academics in the area of education, several suggestions to bridge the gaps between IT and IL in the school curriculum are presented. These include compulsory IL training for all teachers; the revival of the now defunct School Libraries Unit within the Ministry of Education; the creation of the role of a full-time teacher librarian within each school; and the seamless integration of IT and IL training within the school curriculum.

Keywords: Information literacy; Information technology; Education; Schools; Singapore

RESEARCH NOTE

Introduction

As society plunges into the era of high-speed technology and globally connected media in this twenty-first century, it is inevitable for schools to furnish their learning landscape and curriculum with advanced computers and technology-enhanced pedagogy respectively. Schools face the daunting task of equipping students with the necessary knowledge and skills, to prepare them for the roles of knowledge workers that society demands when they venture into the real world.

Some schools and governments do not hesitate to spend large amounts of money on computer hardware and software, and even educational technology training for both teachers and students. For instance, the United States Department of Education (USDE) had apportioned more than US$4.9 billion for educational technology alone in the fiscal year 2005 (USDE, 2005). This amount did not include related programmes and training. In Denmark, the
Ministry of Education aimed to provide every five to ten students with a modern and state-of-the-art computer in schools by the end of 2005 (Danish Ministry of Education, 2004). In early 2006, the British Columbia Ministry of Education (BCMOE) disbursed close to C$50 million to schools to spend on computer technology and learning resources, in a move to make the province the best-educated and most literate jurisdiction on the North American continent (BCMOE, 2006). Halfway across the globe in Singapore, the Ministry of Education (MOE) spent about S$2 billion on integrating information technology (IT) in the school curriculum from 1997 to 2002 (Singapore Press Holdings, 2003, December 10). The MOE disbursed another S$600 million a year to maintain and replace computer hardware, develop new educational software and for the continuous training of teachers in teaching using IT (Teo, 1997 April).

Despite heavy spending on IT in education in many countries, it is not often proven that educational technology alone will ensure students learn the necessary competencies for them to thrive and succeed in the digital age. There have also been grouses from teachers that there is insufficient training on the effective use of IT in teaching and learning (Eriksen, 2004; International Society for Technology in Education & The Milken Family Foundation, 1999; Willis & Mehlinger, 1996, as cited in Taylor, 2004). Although their schools are well-equipped with IT hardware, these teachers feel that they are not competent enough to seamlessly integrate IT to enhance their teaching. Thus, despite the fact that proponents of educational technology are enthusiastic about its benefits, sceptics are able to dispute the extent to which technology positively impacts teaching and learning (O’Dwyer, Russell & Bebell, 2004).

**Information technology and information literacy in schools**

Advocates of educational technology assert that information technology, which is effectively planned and used in the classroom, will have positive effects on the academic achievements of students and their disposition towards learning (Cuban, Kirkpatrick & Craig, 2001; Wetzel, Zambo & Padgett, 2001; Schacter & Fagnano, 1999), which are measured by standardised tests. However, critics are often cautious not to accord all the credit to educational technology alone. It is acknowledged and accepted that standardised test scores only cannot truly evaluate the extent of learning that occurs when educational technology is employed in the classroom (Bebell, O’Dwyer, Russell & Seeley, 2004). Essential skills such as critical thinking, creative problem solving and analytical abilities are often overlooked in mere standardised tests (McNabb, Hawkes & Rouk, 1999). It is thus necessary to complement standardised tests with student-centric assignments such as projects and problem-based or inquiry-based learning, which incorporates the use of the school library and the information resources within, in order to fully complement a technology-rich learning environment. However, it is important to realise that the focus of learning should not be on the effectiveness of computer hardware or software themselves, but on the learning process that students experience first-hand (Lamb, 2004), where technology is merely a tool that facilitates learning.

Regardless of whether students need to complete standardised competency assignments, or carry out problem or project-based learning, students still need to be able to combine new information with prior knowledge and generate new knowledge from the two. This in turn provides students with the motivation to learn (Mims, 2003). However, due to the increasing quantity and varying quality of information available, be it electronically or in print, teachers need to widen the scope of their teaching roles and responsibilities (Smolin & Lawless, 2003).
They must incorporate the use of various information sources into the curriculum that allow them to construct, represent and communicate knowledge to their students and at the same time, provide the guidance that their students need. The main learning component that must be inculcated in students is information literacy, which is essentially the ability to “recognize the need for information and to effectively access, evaluate and use information” (American Library Association (ALA), 1989). It is with this ability that students can then become the dynamic and independent learners and thinkers that most education systems in the world aspire them to be.

Information literacy helps make complex things more accessible and comprehensible (Brindley, 2001), mainly through the ability to filter useful information from irrelevant and non-authoritative material. The widespread availability of technology and specifically, the Internet has placed information within easy reach. It has been observed that the Internet is the information resource of choice for most students (Heil, 2005; Minkel, 2002; O’Sullivan & Scott, 2000). However, due to the ubiquitous nature of these technologies and the Internet itself, problems of misinformation and disinformation are also prevalent (Hernon, 1995). Misinformation occurs when an honest mistake is made in presenting information, whilst disinformation occurs when there is a deliberate attempt to mislead or deceive readers by giving inaccurate information. Either way, erroneous information can be easily conveyed. This is because anyone can produce and disseminate a piece of information, be it fact or opinion, and make it seem authoritative. It would then be extremely tricky to determine the reliability, validity and authority of any piece of information.

Students’ assignments are often detected to contain information that is simply copied and pasted from the Internet (Minkel, 2002), and these usually go undetected even under their teachers’ supervision or assessment. Due to the large amounts of information available, it is a constant challenge for teachers to be able to identify which has been blatantly copied from Internet sources. In addition, teachers themselves find it difficult to select the most useful and reliable pieces of information from the Internet that effectively complement the school curriculum when they do lesson planning (Smolin & Lawless, 2003; Hunt, 1997). Thus, it is imperative that information literacy becomes a necessary component in enhancing the use of information technology in schools, as found in the UK-based CITSCAPES Project and Big Blue Project (Joint Information Systems Committee, 2002a; 2002b).

Schools that have employed information literacy lessons in their curriculum have shown encouraging response and results from among their teachers and students (Hinchliffe, 2003; Rockman, 2002; Hancock, 1997). However, information literacy is not a curriculum requirement that is accorded top priority in most schools. More often than not, educators and school administrators often confuse it with information technology skills (Corrall, (n.d) as cited in Owen, 2003) or simply information access (Whelan, 2003), or ignore the need for it altogether. It is thus important to appreciate the distinction between information or educational technology, and information literacy, and identify the ways in which the two can be complementarily implemented in the school curriculum.

Development of information technology in the Singapore school curriculum

The Ministry of Education (MOE) started formulating the Masterplan 1 for Information Technology (IT) in Education (mp1) in the mid-1990s (MOE, 1997d). There were two focuses in the development and execution of mp1. Firstly; it was to present an overall blueprint for the use of IT in schools. Secondly, it was to provide every school-going child
with access to an IT-rich curriculum and school environment. The first masterplan was to be implemented from 1997 to 2002.

A conference cum exhibition, iTopia, was held in mid-2002 to mark the end of the first phase of MOE's journey towards the effective use of IT in schools. It was also a platform to highlight innovation and achievements in education through the use of IT within the last 5 years, and simultaneously introduce the next phase of the journey, the Masterplan 2 for IT in Education (mp2). The main purpose of mp2 was to bolster the developments and achievements of mp1, and to further stimulate critical thinking, creativity and independent learning among students using IT (MOE, 2002). The second masterplan was to be implemented from 2002 to 2007.

The implementation of mp1 and mp2 had brought about reforms in the education system in Singapore, for both students and teachers. New curriculum initiatives and strategies were planned and proposed, and new teaching methodologies were designed and recommended. However, it was interesting to note that information literacy was not a component that was explicitly mentioned in either mp1 or mp2. Overall, these reforms were only possible through the intensive and extensive support from both MOE and the management of each school. MOE provided schools with sufficient funds, training programs and freedom to procure computers, to equip both teachers and students with proper IT training, and to set up various forms of IT-based activities and ventures within the school. The school management were given the autonomy to engage commercial vendors to help set up their school's IT programs or to forge collaborations with various organizations from all over the world. The MOE launched the Programme for Rebuilding and IMproving Existing schools, or PRIME, in May 1999, with the sole objective of upgrading all schools to current standards, in order to provide a conducive learning environment for students (MOE, 1999b). Among the new facilities that schools received, were bigger media resource libraries and more technologically equipped classrooms. PRIME was estimated to cost around S$4.5 billion. In addition, all Singapore school libraries were electronically linked through the MOE Integrated Library Network System, or MERLIN, in October 1999 (MOE, 1999a). This move allowed schools to share library resources and teachers to have access to a larger database of information sources.

Within the school, teachers were given the opportunity to furnish themselves with IT skills and at the same time, share their learning experiences and new teaching practices based on IT with other teachers. The MOE’s Online Training Administration System or TRAISI, allowed teachers to put up courses that they wanted to conduct and share with their colleagues, or sign up for available courses which were relevant to their needs. Teachers were also encouraged to upgrade their IT skills through online courses accessible on the Virtual Institute of Training and Learning (VITAL) (MOE, 2001). In addition, teachers were strongly encouraged to apportion at least 30% of their lessons to IT-based ones.

All these steps were taken to help ease the transition to an IT environment in schools for both teachers and students, with the hope of changing the learning culture within the education system, in addition to preparing the future generation to readily embrace the rapid technological advancements that are happening every day. In addition, new learning initiatives and strategies were also proposed and introduced by MOE, such as Project Work (MOE, 2000), Problem-based learning and Strategies for Active and Independent Learning (SAIL) (MOE, 2004). These learning initiatives and strategies were to facilitate the use of IT in teaching and learning, and equip students with the necessary technological skills that are required in the work force.
Information literacy initiatives in the Singapore school curriculum

The School Libraries Unit of the MOE’s Curriculum Planning and Development Division (CPDD) prepared and published the ‘Information Literacy Guidelines’ and ‘Information Literacy Supplementary Materials’ for use in Singapore schools (MOE, 1997b & 1997c), from primary schools right through to pre-university. The ‘Information Literacy Guidelines’ provided a framework to teach students how to learn and think clearly; two important skills that were highlighted in the document. These skills were expected to provide students with the ability to manage their learning, handle the voluminous amount of information available, and make novel and creative use of the information obtained (MOE, 1997b). This in turn should empower students to be lifelong learners. The document also included a list of the various skills and knowledge that students at the primary, secondary and pre-university levels should obtain, including the attitudes that they ought to portray; recommendations on how the information literacy programme could be implemented within the school curriculum; and rubrics for standards on performance in information literacy. In addition, brief sample lesson plans for specific subjects at certain levels, sample pupil performance standard for specialised subjects, and a sample school media resource library programme to support the information literacy programme, were all appended in the document.

The ‘Information Literacy Supplementary Materials’ contained six sample lesson plans for different subject areas specifically at the secondary school level, coupled with suggested activities of how information literacy skills can be integrated into the various subject areas (MOE, 1997c). The proposed lesson activities promoted resource-based and cooperative learning. The document sought to augment the guidelines, as laid out in the previous publication. Another publication, ‘The Extensive Reading and Information Literacy (ERIL) Programme’ was also published in 1997. However, the focus of the ERIL document was on the incorporation of information literacy skills in the English Language secondary school curriculum in particular, with emphasis on reading (MOE, 1997a). The ERIL document provided suggestions on setting up the programme, two ways of monitoring students’ progress in the programme (ie. post-reading activities and continuous assessment assignments), and the criteria for evaluating the programme. A sample scheme of work was also included for teachers to adhere to.

The three documents were used briefly by teachers in schools, immediately upon their publication and circulation. However, all three documents had a short lease of purpose and have ceased to be used in schools.

The MOE collaborated with the National Library Board Institute (NLBI) and conducted training courses for the Heads of Department for Information Technology and Media Resource Library (HOD IT/MRL) from secondary schools, beginning in 1998 (NLBI, 1998). Professionals from the field were consulted and drawn in to teach various modules in the course. Information Literacy was one of the components of the course. A year later, the MOE and the National Library Board (NLB) organised the Library@School Conference in September 1999 with the specific objective of helping schools enhance their libraries and extend their services (MOE, 1999b). The conference aspired to be a common working ground for practitioners from schools and the NLB, and experts in the field of Library and Information Science to share ideas and strategies on how school libraries could transform themselves into information-rich, borderless educational learning hubs of the new millennium. Nevertheless, similarly, such IL-based workshops and conferences are no longer
conducted for teachers.

**Problem statement**

It was generally observed that although there had been several MOE-based initiatives in promoting and infusing information literacy skills in schools, there was still unawareness of and apathy towards the importance of IL skills in teaching and learning. This probably subsequently led to its diminished role in the education system. However, IT initiatives and skills were more widely accepted and adopted into the education system due to their more apparent usefulness and immediate applications in this technology-driven era. This disparity was surprising despite the fact that both the MOE-based IL and IT initiatives were introduced around the same time in 1997. It was thus important to gather the views of practitioners and academics in the area of education, in order to explore factors that led to the demise of one and the proliferation of the other.

**Perceptions of practitioners and academics**

Semi-structured interviews were conducted to elicit the perceptions of practitioners and academics in the area of education. Altogether, ten respondents were individually interviewed. Each interview session lasted between forty and sixty minutes to complete and the respondents’ answers to the interview questions were transcribed.

For the interview, respondents were asked to give their views on the following issues:
(a) understanding of IT in teaching and learning
(b) understanding of Information Literacy (IL)
(c) roles of IL and IT in teaching and learning
(d) IL training programme for teachers
(e) school libraries and the roles of the qualified school librarian
(f) integration of IL and IT within the school curriculum

No computer-based qualitative tools were used to analyse the responses as the volume of data collected was not large and could be managed and analysed manually. Common themes and viewpoints that were observed in the responses were identified, and excerpts were extracted to support collective views or interesting individual perceptions on the issues listed above. Table 1 presents the demographic information of the respondents involved in the interviews.

**Understanding of IT in Teaching and Learning**

Respondents were very confident of what educational technology entails. In general, the respondents stated that educational technology involves the use of information technology tools to teach and enhance learning. As one respondent replied:-
“…hardware and software resources, support and infrastructure that [are] used in teaching [or] learning” – Respondent F

**Understanding of Information Literacy (IL)**

Out of the 10 respondents, only 5 fully understood what information literacy is, ie. the ability to access, evaluate and use information from diverse sources critically, effectively and creatively (ALA, 1989). Overall, the respondents gave varied responses such as:-
“…knowing how to search for information” – Respondent A
“…use of the Internet…” – Respondent B
“…involves range of higher order thinking skills…” – Respondent E
“…navigating through search engines and shortlisting information” – Respondent G
and “…process of finding information and using them effectively” – Respondent I

Table 1. Demographics of interview respondents.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Sex</th>
<th>Highest Educational Qualification</th>
<th>Current Appointment</th>
<th>Teaching Level</th>
<th>No. of Years of Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>M</td>
<td>BA, PGDE</td>
<td>Classroom teacher</td>
<td>Primary</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>F</td>
<td>MBA, PGDE</td>
<td>Classroom teacher</td>
<td>Secondary</td>
<td>5</td>
</tr>
<tr>
<td>C</td>
<td>M</td>
<td>MSc, PGDE</td>
<td>Vice principal</td>
<td>Secondary</td>
<td>10</td>
</tr>
<tr>
<td>D</td>
<td>F</td>
<td>BA, PGDE</td>
<td>Classroom teacher</td>
<td>Secondary</td>
<td>5</td>
</tr>
<tr>
<td>E</td>
<td>F</td>
<td>BA, Dip Ed</td>
<td>Head of Department</td>
<td>Secondary</td>
<td>20</td>
</tr>
<tr>
<td>F</td>
<td>M</td>
<td>BEng (Hon), PGDE</td>
<td>Subject Head</td>
<td>Junior College</td>
<td>5</td>
</tr>
<tr>
<td>G</td>
<td>F</td>
<td>BA (Hon), PGDE</td>
<td>Classroom teacher</td>
<td>Junior College</td>
<td>6</td>
</tr>
<tr>
<td>H</td>
<td>F</td>
<td>PhD</td>
<td>Associate Professor</td>
<td>University</td>
<td>36</td>
</tr>
<tr>
<td>I</td>
<td>F</td>
<td>PhD</td>
<td>Assistant Professor</td>
<td>University</td>
<td>14</td>
</tr>
<tr>
<td>J</td>
<td>M</td>
<td>PhD</td>
<td>Assistant Professor</td>
<td>University</td>
<td>6</td>
</tr>
</tbody>
</table>

Notes: Acronyms used:

PhD = Doctor of Philosophy
PGDE = Postgraduate Diploma in Education
MSc = Master of Science
MA = Master of Arts
MBA = Master in Business Administration
BEng = Bachelor of Engineering
BA = Bachelor of Arts

Roles of IL and IT in Teaching and Learning

Out of the ten respondents interviewed, eight felt that there is a strong relationship between IT and IL. They felt that both are very “distinct entities yet complementary” (Respondent E), and that the “use of technologies in teaching and learning draws on IL skills” (Respondent J). Two respondents felt that IT and IL are very different yet both are necessary to enhance the learning ambience. One respondent said that “…being IT literate entails being able to use IT to teach and learn effectively, whilst being information literate is knowing how to find and use information effectively” (Respondent I). Another respondent added that “…educational technologies help to enrich learning but information literacy is learning how to learn…” (Respondent C).

IL Training Programme for Teachers

All of the respondents felt that teachers should be equipped with information literacy skills. Seven out of the 10 respondents believed that IL training should be integrated with IT training, as the two are complementary to each other. Some responses given were:-

“…if separate, [skills and knowledge] may be taken out of context” – Respondent J
“…[IL] should be part and parcel of IT training, should not be separated…” – Respondent F

School Libraries and the Roles of the Qualified School Librarian

Out of the 7 respondents who were not teaching at the university level, six of them had a fulltime school librarian in their schools. All 10 respondents agreed to the notion of having a qualified, full-time school librarian who is qualified to teach information literacy to both students and teachers, and that it would be the ideal case. Among the responses given were:-
“…this sounds promising, although most school librarians are not skilled [or] qualified…” – Respondent D
“…good idea” – Respondent G
“…school librarians can work with teachers especially in integrating IL skills within the discipline based curriculum” – Respondent J

Out of the 5 respondents who were asked whether they had heard or come across the “Information Literacy Guidelines” published by MOE’s CPDD in 1997, all of them replied in the negative. When asked about their opinion of their school libraries, three out of these 5 respondents felt that a lot more could be done to their school libraries. One respondent felt that with the currently defunct status of the School Libraries Unit (SLU) in the MOE, “…less importance is given to school libraries due to budget cuts…” (Respondent E), while another felt that “…the [school] library is just a place for students to hang out after school or [during] recess time…” (Respondent A). All the 5 respondents felt that it would be a good idea to reinstate SLU so as to provide more authority to school libraries and oversee information literacy training within the schools. One respondent said that the SLU would help to “…centralise the management of school libraries…” (Respondent B).

Integration of IL and IT within the School Curriculum

The respondents felt that IT and IL should be integrated within the school curriculum as each one has a role in enhancing teaching and enriching learning. One respondent felt that IT and IL can be incorporated synergistically, for instance through Project Work (PW) as “students do not know how to access information, so PW is a good opportunity” (Respondent D). However, some respondents felt that integrating IL in PW alone is not very feasible:– “…process of monitoring [skills and application] would be difficult” – Respondent B “…IL skills should not be taught constrained within one subject. They should be taught generically and students learn how to apply them in various subjects” – Respondent I

Based on the opinions and perceptions of the respondents, there are several potential solutions that can be explored to incorporate information literacy and information technology seamlessly in the Singapore education system.

Suggestions for integrating information literacy and information technology in the Singapore school curriculum

In order to fully complement the incorporation of information technology in the Singapore education system, it is only apt to include information literacy (IL) training. For a start, teachers should be provided with training to equip them with IL skills, on top of the training that they had already received on IT skills. The IL training programme should be made compulsory and should be extended to all teachers and not just those who are in the IT or school library committees, or teachers who are Heads of Departments (Majid, Chaudhry, Foo & Logan, 2002). Professionals or experts in the area could be engaged by the MOE to conduct the training programme. These professionals could be the academic staff from the Division of Information Studies of Nanyang Technological University and also the professionally qualified librarians from the National Library Board (NLB).

In addition, MOE should also consider reviving the now defunct School Libraries Unit under the Curriculum Planning and Development Division (CPDD) and bestow more autonomy to
the unit to organise school library programmes that are seamlessly integrated in the school curriculum (Lance, Rodney & Hamilton-Pennell, 2005; Todd, 1995). For instance, an incremental multi-year school library training programme that is conducted weekly for students could be developed and implemented in all schools (MacDonald, Rathemacher & Burkhardt, 2000). This programme could incorporate IL and IT skills for students, as part of a compulsory annual enrichment component in the school curriculum. This would mean that a primary school student would take 6 years to complete the basic IL-IT training module that is taught once a week, and when he proceeds to secondary school, he would then continue with the intermediate module, and thereafter the advanced module at the pre-university level. This staggered training programme would ensure continuity in learning and would accord more importance to the programme, instead of a one-off training course. To elaborate, at the primary school level, students may start off the programme (at Primary One) with learning how to locate books in the school library, learning how to do a show-and-tell of a book that they have read, and creating book jackets on a graphic software on the computer. The following year (at Primary Two), students can learn how to identify the different components of a book and write simple book reviews using a word processor on the computer. This could continue in stages until the advanced level of being able to fulfil the requirements of an information literate individual who is able to utilise IT to conduct independent research and write critical review papers.

Nevertheless, a school’s ability to conduct such a big-scale IL-IT training programme is only possible if a full-time professionally qualified school teacher-librarian is available in each and every school. This is to ensure that the programme can be conducted by the school teacher librarian and that other teachers are not overly taxed with additional IL-IT teaching duties. MOE should realise the need for professionally qualified school librarians and formally recognise the crucial role of teachers who have such qualifications (Foo, 2000). Such teachers who are outfitted with both pedagogical knowledge and library competencies are invaluable assets to the school, and it would be pragmatic to assign such teachers to the role of full-time teacher-librarian who would oversee the running of school library programmes such as the ILIT training programme.

Another way of incorporating IL within the school curriculum is through project-based assignments or through project work. Although some of the respondents who were interviewed felt that integrating IL in project work alone may not be very feasible, research has shown that project-based learning provides a good platform for students to learn IL and IT skills in tandem (Mokhtar & Majid, 2006; Thomas, 2000). Thus, a project-based learning activity can be conducted over a term (ten weeks) or two for students. They can be taught by IL-trained teachers, the various components of IL skills that they would need in the course of their project work. They can also be shown what are the various information sources available, how to formulate search strategies, use search engines and information databases, evaluate search results and the information contained therein, sieve the needed information and make proper references and citations, and also be introduced to issues in copyright and plagiarism. After students are taught the necessary IL competencies, they can then be informed of their project topics or theme and be coached on how to get the required information in order to complete their project. IT, in the form of computers and internet connection, would be a vital tool for students in this case – for them to surf different websites and information portals, and for them to produce their project reports. Once schools have smoothly assimilated IL within their school curriculum, which is already technologically enabled, students would undoubtedly be able to come up with other novel and creative ways of combining IL and IT in their learning. These new skills would place the
student at a competitive advantage in the global knowledge-based economy job market.

**Conclusion**

Although IT has been integrated extensively in Singapore schools, it has mainly entailed the use of Web-based technology in teaching and learning. What is lacking is the infusion of necessary knowledge and skills to use Web-based information effectively, critically, and ethnically, i.e. information literacy competencies. In short, information technology and information literacy cannot and should not be carried out separately from each other in schools. They are very much two sides of the same coin – each assuming its own unique roles but at the same time completing the entity on which they are established (i.e. the education system). Both must be employed in tandem within the education system in order to provide a holistic learning environment for students, to prepare them for the global knowledge-based economy.

**References**


foundation for active learning. *Journal for Educational Media, 29*(3), 201-211.


