INTERNET-BASED MATHEMATICS LEARNING: IS INDONESIA ABLE TO PUT THE INTERNET INTO MATHEMATICS CLASSROOM?

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ABSTRACT

It was known that Internet access is becoming widely available in the South East Asian region such as Brunei, Cambodia, as well as Indonesia. Recently, not only Information and Communication of Technology (ICT) use in teaching and learning but also internet is becoming major issues in education particularly in science and mathematics classroom. Was the internet access could make significance change in Indonesia mathematics classroom? What the Internet-based mathematics classroom? What the opportunities and challenges of use the internet in Indonesia Mathematics classroom? What competencies needed to attain positive response toward internet-based Mathematics learning? The answer to this questions are the focus of this paper.

Keywords: Internet-based mathematics, mathematics teaching and learning, Information and Communication Technology (ICT) based learning

1. Introduction

Internet access is now commonplace in Indonesia for example restaurants, cafes, public service offices as well as primary public and private school in Indonesia which is provide free access for both of their teachers and students. Internet has continued to rise in significance across the developed Indonesia. The most large number users of the internet is students and workers. Based on their profession (Ali, 2004) internet has been used by various kind of profession and education background. Hence, we know that internet has been utilized in almost every aspect on Indonesia life.

Numerous study have been conducted related to the educational potential of the ICT (Information and Communication Technology) as well as internet used in Indonesia classroom (Rachmawati & Cynthia, 2010; Pannen, Riyanti & Pramuki, 2007; Ali, 2004). Despite this, the use of ICT which is includes the implementation of e-learning in Indonesia still having problem which is need further evaluation and development in order to attain proper educational program. Although the development of ICT in Indonesia is less extensive compared with the neighboring countries such us Singapore, Malaysia and Thailand (Ali, 2004). However, Indonesia has large potential users of the internet, for example the number of facebook users in Indonesia up to 43.06 million users that is placed Indonesia as the third most social network access countries in the world after USA and India. Generally, based on MarkPlus Insight (2011) the number of accessing internet users in Indonesia reaches 55 millions, with 50%-80 % users from 15-30 years old. Hence, there is no doubt that accessing the
internet is common thing for youth, thus we can assume that they have an ability to navigate appropriateness of web tools used, enter the URL as well as upload files when accessing website. The most recent one the number of Indonesia internet user is third place in Asia. Based on Internet World Stats (2012) in the report of the 20 countries with the highest number of internet users, Indonesia place in the eighth place below Russia and Germany.

Furthermore, in some ways i.e. particularly in social science and pharmacy (Lertnattee, Chomya & Sornlertlamvanich, 2010) internet is now needed by either students or teachers to support material learning. Unlike earlier form of technology, the internet liberally sprinkled with its advantage reference materials provided and increasingly becoming familiar to most modern students.

This paper discuss what internet based mathematics learning is; both the opportunities and challenges of use the internet in Indonesia mathematics classroom. It also discuss competencies needed to attain positive response toward internet-based mathematics learning.

It is impotant to note that the issues of teaching mathematics using the internet has been studied by the researchers across the world and amount of funding of conciderably number of website for mathematics teaching and learning on the internet (see Loong, 2001; Kissane, 2008). The author sees a chance for Indonesia to conciderate internet-based mathematics learning and its components to be implemented in education curriculum. This conversation has become necessary because the popularity of internet access tend to social network web site e.g twitter, facebook as well as game onlin e instead of appropriate learning sources website particularly mathematics sources website.

2. Internet-Based Mathematics Learning Defined

The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support email. Many people use the terms Internet and World Wide Web, or just the Web, interchangeably, but the two terms are not synonymous (Loong, 2010). The World Wide Web is a global set of documents, images and other resources, logically interrelated by hyperlinks and referenced with Uniform Resource Identifiers (URIs). Web services also use HTTP to allow software systems to communicate in order to share and exchange business logic and data (Wikipedia, 2012).

Five different kinds of internet uses for mathematics are clearly identified by Kissane (2009b): Interactive opportunity, reading interesting materials, reference materials, communication and problem solving. Internet provide an opportunity for student to interact directly with mathematical object. An example in this category is shown in Figure 1.
Coolmath provide an amusement site to learn mathematics through play game. It is really useful to make students aware the use of mathematics in their daily life without notice that they actually learn mathematics while they play game.

In communication, the internet offers opportunities for student to communicate with other students or teachers, regardless of geographical location. Email is one of an important communications service available on the Internet. The concept of sending electronic text messages between parties in a way analogous to mailing letters or memos predates the creation of the Internet. Pictures, documents and other files are sent as email attachments. The internet also provide services with numerous new by-product like Wikipedia, Skype, Facebook and Twitter. Wikipedia is an internet-based encyclopedia that is written collaboratively by contributors around the world. Skype and Facebook are provide the opportunity for enhanced voice communication between users. The application of internet also obtain statistics data, internet information, math question, math answers, web-math discussion, resource centre, remedial activities, extension activities and game play.
Wikipedia comes in many languages and is free to access. Wikipedia also has mathematics portal which provide numerous informations about mathematics i.e histories of mathematics, mathematics scientists and mathematics news. Numerous of internet resource has been provided in 21st century including in both of providing information and communication in teaching and learning.

Put simply, internet-based mathematics learning is the kind of learning opportunities in using the internet for learning and teaching mathematics. It is not only limited to how student access the internet in mathematics classroom but also how teachers could manage the internet content in order to suitable to use in mathematics. Internet uses in this learning include in the forms of electronic mail (e-mail), bulletin board, downloading course materials or tutorials, interactive tutorial on the web and interactive conferences. All of those activities can be conducted through the internet (Anderson, 2010; Loong, 2010; Loong, 2009; Kissane, 2008; Barnes & Loong, 2003; Loong, 2003; White & Loong, 2004; White & Loong, 2003; Loong, 2001; Patahuddin & Dole, nd).

3. Internet in Indonesia Education System

According to 2011 ICT statistics in education (The center for research and application of Information and Electronic Technologies of the Ministry Communication and Information Technology Republic of Indonesia). The number of school which using ICT tools particularly in using radio is 181; television is 391; telephone is 756; computer is 785 and internet access is 641. The school proportion with ICT tools using by types of schools and its percentage is represented by table 1.

Table 1: School Proportion in ICT Use by the School Type

<table>
<thead>
<tr>
<th>ICT Use</th>
<th>Public</th>
<th>Private</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Radio</td>
<td>119</td>
<td>43</td>
<td>62</td>
</tr>
<tr>
<td>Television</td>
<td>264</td>
<td>29</td>
<td>12</td>
</tr>
<tr>
<td>Telephone</td>
<td>520</td>
<td>38</td>
<td>23</td>
</tr>
<tr>
<td>Computer</td>
<td>548</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>Internet Access</td>
<td>435</td>
<td>12</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 1 shows that there is no highly differences of ICT use between public school and private school. However, private school obtain higher proportion than public school. It also shows the internet access in both of public and private school which represented that precentage of public school and private in Indonesia which used the internet is 77,96% and 86,55%, respectively. It was indicated that most of Indonesia schools have internet access in school environment. Further more, The use of internet as learning tool can be showed in table 2 that represent the number of school which is
conduct exercise or home work through the internet and its percentage by the school type.

Table 2: School Proportion in Conducting Exercise Through the Internet by School Type

<table>
<thead>
<tr>
<th>Giving Exercise Through Internet Access</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public</td>
<td>Private</td>
</tr>
<tr>
<td>Yes</td>
<td>419</td>
<td>209</td>
</tr>
<tr>
<td>No</td>
<td>139</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>558</td>
<td>238</td>
</tr>
</tbody>
</table>

Table 2 shows that most of schools have conducted learning activities through the internet by giving home work. It also shows that internet use in private school higher than public school which represent by its percentage of private school and public school is 87.82% and 75.09%, respectively. To sum up, below was provided the time average of teaching and learning process use ICT by school type.

Table 3: Time Average of Teaching and Learning Process Use ICT by School Type

<table>
<thead>
<tr>
<th>Subject</th>
<th>School Type</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public</td>
<td>Private</td>
</tr>
<tr>
<td>Mathematics</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Science</td>
<td>2.9</td>
<td>2.6</td>
</tr>
<tr>
<td>Basic Computer Skill</td>
<td>3</td>
<td>3.1</td>
</tr>
<tr>
<td>Language</td>
<td>2.9</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Table 3 shows that the average time of mathematics teaching and learning process use ICT is higher than science does. Mathematics and Science time average of teaching and learning process use ICT is 2.9 and 2.8 respectively. Compared with Basic computer and language time average of teaching and learning process use ICT, mathematics time average is lower. Despite those, it also shows us particularly that mathematics has been used to use the ICT tool in classroom. Thus, the possibility to one step further in using the internet in mathematics classroom could be taken account. The report from the center for research and application of Information and Electronic Technologies of the Ministry Communication and Information Technology Republic of Indonesia above shows us that Indonesia has been providing the new environment of teaching and learning through technology in this 21st century.

4. Challenging for Indonesia

The Internet came with unlimited amounts of content and new demands on teachers. Despite the potential, evidence is also mounting of the challenge in adapting these technology to the teaching and learning curriculum (Wood, Barnes, Vivian, Scutter & Stoles-Thompson, 2010) and so do the implementation of internet in Mathematics classroom faces several infrastructural and personal challenges. The important part of adopting technology in learning process are assess the readiness of study to make effective use of technologies, school leadership for integration of ICT in the teaching
learning process and preparation of teachers. Buabeng-Andoh (2012) argue the factors (barriers) that discourage the use of ICT are categorized into teacher-level, school-level and system-level barrier. The Readiness of students to make effective use of internet, preparation of teacher and school leadership and policy for integrating of internet in mathematics classroom are elaborated in the following section:

4.1 The Readiness of Students to Make Effective Use of Internet

It has been told in previous section about the popularity of internet application among students. Despite of its popularity, it is important to note that Indonesia internet users per 100 inhabitant are still lower than the number of ASIA users. Also, the students’ skill using internet tools and accessing numerous website and social networking there is slightly difference between internet skill in learning and recreation purposes. Although internet is common thing in students’ life. However, the students should to know how the rule in accessing the internet in learning process. Loong (2009) on her report concluded that getting student to stay on task while on the Internet is certainly no small task. It requires effort in preparation, close monitoring in the classroom to avoid dissipilinary problems, overcoming technical glitches and a huge amount of confidence that these problems can be resolved with preseverance and routine. Rachmawati & Cynthia (2010) described the competencies should be possessed by secondary school students particularly the competencies of student in internet can be showed in table 4.

Table 4: The Percentage of Competencies of Students in Internet

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Highly Skilled</th>
<th>Quite Skilled</th>
<th>Skilled</th>
<th>Not Skilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice Internet Access</td>
<td>17,32 %</td>
<td>49,35%</td>
<td>27,27%</td>
<td>6,06%</td>
</tr>
<tr>
<td>Use a web browser to save, store and print information</td>
<td>17,17%</td>
<td>31,76%</td>
<td>36,05%</td>
<td>15,02%</td>
</tr>
<tr>
<td>Use of email</td>
<td>18,38%</td>
<td>43,59%</td>
<td>28,21%</td>
<td>9,83%</td>
</tr>
<tr>
<td>The use of menus and icons in data processing software</td>
<td>37,61%</td>
<td>12,39%</td>
<td>44,02%</td>
<td>5,98%</td>
</tr>
<tr>
<td>Processing numerous variations of text, tables, graphs, drawings, and diagrams</td>
<td>11,97%</td>
<td>43,16%</td>
<td>40,60%</td>
<td>4,27%</td>
</tr>
</tbody>
</table>

Table 4 shows in how students access the internet was done very well by 12,88% of the students, carried out by skilled by 32,62% and most other students are as many as 45,92% of students only can do that. But when they practice internet access, it was 49,35% students can practice with a skilled, more highly skilled 17,32%. While 27,27% of students admitted little could be done. Use a web browser to obtain, save and print information 36,05% students can do little, and 31,76% are skilled to do it. Use of email as information and communication purposes showed from the number of respondents who skilled on it is 43,59%, highly skilled is 18,38% while 28,21% are less able and 9,83% the others can not to do so. The use of menus and icon in data processing software only 37,61% highly skilled; 12,39% quite skilled; 44,02% skilled and 5,98% not skilled. Another case in processing numerous variations of text, tables, graphs, drawings and diagrams as much as 11,97% highly skilled; 43,16% quite skilled, 40,60% skilled and 4,27% not skilled.
4.2 Preparation of Teachers

The using internet in Mathematics classroom is related to the ICT competencies of teacher Mathematics itself. Indonesia government has given a great concern with doing serious effort in providing program utilization of ICT in education which also known as e-education (Ali, 2004). Also the HYLITE (Hybrid Learning for Indonesia Teachers) program which conducted an in-service teachers training program (Pannen, Riyanti & Pramuki, 2007). Further more, the survey which was conducted by Suhartanto (2009) found the some factors which caused unappropriate quality of e-learning. For proper ICT integration in education, the quality of training needs to be taken account. It is important also in how teachers organize learning process and steps in learning about Internet access. Anderson (2011) reminds us, identifying the four broad steps in the way that teachers learn about and gain confidence in using ICT.

4.3 School Leadership and policy for Integrating of Internet in the Mathematics Classroom

School technology leadership is a strong predictor of teachers’ use of computer technology in teaching. Buabeng-Andon (2012) argue, School is one of factors (barrier) that discourage the use of technology by teachers. The school barrier comprise absence of ICT infrastructure, low or poorly maintained hardware, lack of suitable educational software, limited access to ICT, limited project-related experience, lack of ICT maintaining into school’s strategy. Also, government is play a key role in developing, funding, regulating, and promoting internet connectivity. To create a policy environment to internet learning, it is important to have strategies in place to manage infrastructure, connectivity and technology provision, especially in the context of seeking equal opportunities for all. Although Indonesia has an integrated system consisting of two big ICT infrastructures in the Ministry of National Education – JARDIKNAS (Indonesian Education Network) and INHERENT (Indonesian Higher Education Network) which is a sub-network of JARDIKNAS, the access to ICT infrastructure and resources in schools is still low; and hence, most Indonesian schools are either in the emerging or applying stage (Seamolec Report, 2010).

Further more, based on survey which was conducted by Suhartanto (2009) showed many of internet source were careless, even some website were error and could not connect to the learning resources. Some website implemented limited access among the member only, thus the sharing concept to another school not to be taken account. To sum up, if we take a look at the content of website it were far for proper.

5. The Opportunities for Indonesia

It is true that in the early days there was a classroom emphasis on teacher-centred instruction. Student sitting obediently in rows, listening attentively to their teachers, putting up their hands as the teacher asking questions, copying what teacher wrote on the black/white-board (Anderson, 2010). As time passed by, ICT based learning was provided and numerous of research has conducted in the road to looking for the most appropriate learning environment. Now days the learning environment has changed. Internet have had an enormouse impact on society which is gradually evolutioned into modern society. Most of government public and private-office as well as school, colleges and universities use internet to spreading and getting information, sending
files and renewing the latest news. Certainly, it is difficult to imagine how any modern society could update information widely and quickly without internet. People are addicted to the easiness of sharing through the internet anytime. In that sense, internet ushered in a modern society: there can be no going back to the old ways. The impact of internet on every aspect has teased the educationists to integrate internet in classroom, including mathematics classroom. In this section was provided the opportunities of putting the internet in Indonesia mathematics classroom based on the author’s review.

5.1 Mathematics and Internet in Other Countries

Where the internet is available, teachers and students routinely employ search engine to look for information to complete assignments. In quite a short period of time, internet has had a marked effect on school, on teaching and learning. According to United Nations Under-Secretary-General for communications and public information (Anderson, 2010), Australia has more broadband subscribers than the whole Africa and China is now ahead of United States in having the largest number of internet users in the world. Also, Australia is one country which continuously explores the internet use in mathematics classroom (see Kissane, 2009b). Kissane (2009b) has explored a typology of ways in which the internet might be used by relatively unsophisticated users to support and augment the teaching and learning of mathematics. He also showed that there was much to offer students as well as their teachers, already on the internet.

The positive responses in teaching mathematics using the internet also showed by Loong (2010), Patahuddin (2008) and Loong & White (2003, 2004). Furthermore, Kissane (2008) emphasized that there is much to offer both students and their teachers already on the internet, without subscription charges, and every prospect that the available offering will increase. To sum up, the use of internet in mathematics classroom across the Asia-Pacific region is bringing about change in the way teachers teach and how students learn.

5.2 Internet in Education Policies

Enhancement of national human resources in science and technology is one of the three main strategies of Indonesia’s economic development (known as MPE3I). In this context, educated human resources are becoming the main key in supporting the growth of sustainable economic. Thus, the main goal of Indonesia’s education system is to enhance human resources who can be adapted quickly in science and technology development. As other countries, Indonesia is determined to harness the use of information and communication technologies for increasing the country’s national competitiveness (Belawati, nd). The Ministry of National Education has conducted several initiatives and programmes related to the use of internet in education. Some of the government initiatives and programmes are explained by Belawati (nd).

- WANkota (Wide Area Network-CITY), This was initiated by members of SIN10 with the objective of connecting school LANs within and between cities using a wireless connection. The project, which included eight cities (Malang, Surakarta, Yogyakarta, Wonosari, Bandung, Cibinong, Tangerang and Makasar), is predominately funded and supported by participating schools.
and local district governments. WANKota serves as a distance-library, a medium for teleconferencing and as an access to the internet through which all the schools will have a space for developing and hosting their own websites.

- ICT block grants for secondary schools, The Directorate of General Secondary education and Ministry of National Education initiated a system block grants to procure computer facilities. The project during 2002 and 2003, has allocated grants to about 174 schools throughout the country.

- Mobile PLIKs (MPLIK) is a mobile internet service center district. The purpose is to serve the general public who are in unreached areas by the district internet facilities. This program is based on the regulation of the Ministry of Communication and Information article 5 Number 48/PER/M.KOMINFO/11/2009 and has amended by about internet access provider the regulation of the Ministry of Communication and Information Number 19/PER/M.KOMINFO/12/2010 about internet service providers in district areas. This program is synergy with KPU/ISO and Community Access Point (CAP) program which is targeted about 1907 MPLIK will be spread throughout the territory of Indonesia (see www.mplik.com).

- E-edukasi or e-education project of PUSTEKKOM, in cooperation with the Directorate of Vocational Education, this project was started in 2002. The objective is to improve the quality of education in high and vocational schools through the use of internet-based learning materials (termed e-learning). Despite Indonesian schools being in the beginning stages, E-edukasi.net is a best practice programme to be highlighted in this dimension. e-edukasi.net was initiated in 2003 to provide students and teachers in Indonesia with rich and engaging learning resources. It was then integrated into JARDIKNAS when the latter was set up.

From the programs above it shows that Indonesia has given a great concern with doing serious effort in providing internet access among the teachers, students and schools.

### 5.3 Teacher and Student Training

Besides of the government policies, numerous private institutions also have initiative programmes in the aim to enhance internet and computer literacy in Indonesia, including the following:

- The *National Education System Law No. 14 of 2005* ± The law specifies provisions for teacher education reform. One crucial point worth mentioning is the epoch-making declaration of “Teachers as Professionals.” This law also places emphasis on actions to improve the quality of education in Indonesian schools. In particular, it addresses measures considered necessary to empower and improve the quality of teachers. This teacher law mandated four groupings of essential competencies all teachers are required to demonstrate. These are: 1) pedagogical; 2) personal; 3) professional, and 4) social. The National Education Standards Board (BSNP) has developed a set of standards for 1) curriculum content, 2) competency standards for graduates, 3) process standards, 4) infrastructure and facilities, 5) education financing standards, 6) evaluation standards, 7) management standards, and 8) standards for teachers,
principals, and school supervisors, all of which are based on the four essential competencies.

- TELKOM (one of the Telecommunication Company in Indonesia) cooperate with Departement of Education East Java initiate School-Net Program. Internet and Web training program has done one full day and simultaneously will be held in 26 locations.
- TELKOM hold an internet training program for high school and Vocational Student in Amaliah Bogor
- Surya Institute (SI) which was founded in 2006 by Prof. Yohanes Surya, PhD. with the vision of transforming Indonesia through 30 thousand Ph.D's in science and technology, supported by the mission to reform Science and Math education in Indonesia have successfully held program computer training for teachers and students in Papua by the year 2011. This program is in cooperation with Kandel Multimedia which have full support of the Indonesian PricewaterhouseCoopers (PwC).
- Uhud Education hold internet training for school superintendents in Blitar from 25-27 September 2012
- HYLITE (Hybrid Learning for Indonesia Teachers) program, is an in-service teachers training program, especially designed for primary school teacher in Indonesia, to improve their qualification from Diploma II to Bachelor Level, conducted via open distance learning mode. It is one of the strategies taken by the Government of Indonesia in providing access for quality education for all, especially for primary school teachers in all areas in Indonesia.

Furthermore, it was relief to know that in the Asia-Pasific region the UNESCO Regional Office for Education has the most comprehensive range of information on ICT in education of any of the UNESCO regional office around the world (Anderson, 2011). This comprehensive range of information provide on the UNESCO’s web portal for teacher (see www.unescobkk.org). It provide numerous further useful link containing resource for problem solving and teaching life skill. National Council Teacher of Mathematics (see www.nctm.org) is well known as the useful website source in the road to accompanying the teacher in order to gain numerous informations, tips, news, and learning materials in teaching mathematics.

6. Competencies Needed for Internet-Based Mathematics

The first step in learning about internet is teachers become aware of internet. How they access and how they are used in appropriate way. At this step, there is usually an emphasis on internet literacy and basic skill. The second step in integrating internet in mathematics classroom is learning how to use internet in mathematics. In this step teachers should have an ability in how to search e-resources on the web for instructional purposes, accessing e-library, familiar with email attachment, blogs, web 2.0 tools, social networking and answer engines. However, the internet resources mostly in english language then it should be conciderate that teacher have english literacy. The third step in learning about internet is understanding when to use internet into mathematics classroom. It is important for teacher to understand that not all of learning process must use the internet in learning process. This step implies the ability to recognize situations where internet will be helpful as well as choosing the most appropriate time for a particular task and learning. The final step in learning about internet involves incorporating within pedagogical strategies and organizational
management in the use internet. Teachers develop an understanding about ways that internet enhance student learning in mathematics.

The competencies needed for internet-based mathematics are have no significance different with competencies needed for ICT in education. Generally, Anderson (2010) has explained what are skills students need for 21st century based on Partnership for 21st Century Skills (P21) analysis. The explanation of those skill were summerized below:

- Core Subject and 21st century themes
- Learning and Innovation skill
- Information, media, and technology skills
- Life and Career Skills

Kim, Yang & Hwang (2010) have explained teacher competency indicators for ICT in education. The first indicators focused on teacher computer literacy and information processing based on the teacher career, while the second indicator focused on teacher use of ICT for education based on career and subject.

Table 5: A summary of the ICT Skill Standard for teacher (ISST)

<table>
<thead>
<tr>
<th>Category</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Gathering</td>
<td>Identify location, access and read</td>
</tr>
<tr>
<td></td>
<td>Gather and evaluate</td>
</tr>
<tr>
<td></td>
<td>Store and manage</td>
</tr>
<tr>
<td>Information analysis and processing</td>
<td>Produce, edit and word-process materials</td>
</tr>
<tr>
<td></td>
<td>Process and analyze spreadsheet materials</td>
</tr>
<tr>
<td></td>
<td>Produce and edit multimedia materials</td>
</tr>
<tr>
<td></td>
<td>Produce and edit presentation materials</td>
</tr>
<tr>
<td></td>
<td>Use and manage NEIS system</td>
</tr>
<tr>
<td>Information teacher and exchange</td>
<td>Present and transfer</td>
</tr>
<tr>
<td></td>
<td>Communication and exchange</td>
</tr>
<tr>
<td>Information ethics and security</td>
<td>Understanding and information society</td>
</tr>
<tr>
<td></td>
<td>Prevent distribution of harmful materials</td>
</tr>
<tr>
<td></td>
<td>Protect intellectual property</td>
</tr>
<tr>
<td></td>
<td>Manage personal information</td>
</tr>
<tr>
<td></td>
<td>Keep netiquette</td>
</tr>
</tbody>
</table>

The particular competency which need to be have by teachers was identified by UNESCO (2011), Identify and manage Internet safety issues e.g Discuss cyber bullying; appropriate information to post; predators; communication forums; privacy and piracy issues; viruses; scams; spam; cookies; pop-ups; intellectual property rights, copyright, inappropriate content; digital citizenship; email etiquette; ethics; legal requirements; confidentiality of personal data; password issues. Have participants develop appropriate strategies and procedures to deal with these issues.

If teachers are to have sufficient to develop their skill and ideas, they will need to have the committed support of their institution. Teachers also need to be aware of their students’ capabilities and need in ICT. Teacher is not only oriented towards a
social constructivist approach to teaching but also understands in how to exploit digital technologies to support it. For this to be possible, teachers need high quality professional development. Teachers have to learn about the optimal ways of using digital technologies (Laurillard, 2010)

- Teachers need to ‘learn by doing’, become a network
- Share new teaching
- Use pedagogical patterns to exchange good ideas
- Use OER to populate the well-designed pattern
- Improve the use of iCT in teaching and learning.

Basically, if teachers’ attitudes are positive toward the use of educational technology then they can easily provide useful insight about the adopting and integrating of ICT (Buabeng-Andon, 2012) as well as internet into teaching and learning process. If teachers were to use the Internet for learning, they needed to take an active role in organizing technology-based learning, rather than simply sitting back and letting educational software entertain computer users. Teachers needed to access and evaluate content, and then design instructional activities that integrated Internet content with learning objectives and traditional classroom materials. Not only they must be adept at locating good content, but also they must skillfully align that content with teaching outcomes. They must craft learning activities that exploit the best of each instructional strategy —classroom-presented and technology-delivered alike. White (2010) remind us that the teacher need to be given the opportunity to develop the skill required to adopt these new learning environment. These would include the technical skill to operate the equipment skill to develop material suitable for an online environment.

7. Conclusion and Future Recommendation

Mathematics learning should reflect the real world by providing students with opportunities to apply their skill outside of the mathematics classroom. The paper has discussed the issue of internet-based mathematics in the light of what internet-based mathematics is and what competencies needed for internet-based mathematics. It also discuss the opportunities and challenges for Indonesia in using the internet in mathematics classroom. This paper also see the potential of internet to enrich mathematics teaching and learning through numerous research which have been conducted by the expert around the world. The central issue here is that Indonesia still has many ‘homework’ related to the implementing technology in classroom. It is true that many factors account for this situation: readiness of student, preparation of teacher, school leadership and policy of internet use in classroom. Despite those things, Indonesia has been done good work to enhance computer ability as well as internet access across Indonesia area through students and teacher training.

Further research should be conducted related to both of Indonesia teachers’ and students’ perception on implementing the internet into mathematics classroom. Also to find out the best models for harnessing the internet in mathematics classroom need to be considered.

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