

# Barriers for Educational Technology Integration in Contemporary Classroom Environment

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**Abstract** - *This literature review explores the extent of integrating educational technology in contemporary classroom environment among the ASEAN Member States focusing more on the undeveloped and developing countries. It describes the profile of the countries under study in terms of the total population, gross national income (GNI), literacy rating and ICT development index (IDI) and to determine the barriers for educational technology integration; and test the correlation among the profile variables. Results showed that some of the identified probable causes of educational technology integration in most developing countries are: inadequate financial support and infrastructure, human capital, management support, as well as behavioural and environmental aspects. Gross National income is considered a factor that can directly or indirectly influence the Literacy rating and ICT Development Index value of the country while the total population based on ranking of countries has nothing to do with the ranking of GNI, Literacy Rating and IDI value of each country.*

**Keywords:** educational technology, basic education, ASEAN, ICT Development Index

## INTRODUCTION

Technology has brought numerous transformations and innovations in the way society manages and deals with business, politics, religion, economy, education and many others. In all aspects of life, it directly affects negatively and positively the development of the fast changing environment. The benefits of such advancement in computer technology has tremendously succeeded its objectives of providing convenience in the way people learn and communicate through receiving, sending and

processing information that makes everything moves faster than ever.

People learn from formal or informal schooling which describes education based on experience from the environment where technology plays an important part of learning process to make the transfer of knowledge more consistent, reliable and effective. This is where educational technology shows a perfect illustration of teachers and students having fruitful discussion and sharing of knowledge and values through the use of appropriate modern-day instructional materials.

It is hard to believe that since the beginning of educational technology until its proliferation in the contemporary classroom environments, there are still some teachers who resist and refuse to accept the role of technology in the development of learners' ability and there are those who never given an opportunity to experience the benefit it would bring due to lack of resources [1]. This is where creativity of teachers brings out the instructional materials coming from being resourceful. The image of classroom environments in the Third World countries like the Philippines is a mixture of faded black and white with a brighter sense of hope from teachers that through their efforts, there will be colorful lives among the pupils that will stand out in the crowded pigments of the future. Latchem [2] noted that after four decades of digital experiments in classrooms and the expenditure of billions, it really should not be so difficult to find strong evidence of significant overall improvement in educational outcomes

The integration of technology in the delivery of instruction is considered vital in the implementation of student-centered approach of teaching method. But due to inadequate financial resources [3] of third world countries, the government could hardly provide

enough support for basic education to sustain quality teaching and learning process. There is great faith that these technologies will improve teaching and learning, and consequently afford these countries a greater stake in today's knowledge society [4].

Aside from financial resources, it is the task of this study to review the status and other barriers on the integration of educational technology in the contemporary classroom environment among the ASEAN members states considered as developing countries. This study is conducted to compare the status of ICT integration among ASEAN Member states and how far the differences of these neighboring countries in terms of ICT development. The growth of education is an important aspect of economic development where the nation depends on the capacity of its people. If the human resources are not equipped with appropriate skills based on how they were educated in formal schooling due to inadequate resources and facilities for learning, there will be insufficient leadership capacity to lead and sustain the progress of a country. Therefore, findings of the study may serve as substantial input to the policymakers who are considered to be in a unique position to bring about change (Wallet, 2014) to transform the teaching and learning process [5], [6] into a more dynamic system of cultivating the young minds for inclusive innovation.

#### **OBJECTIVES OF THE STUDY**

This literature review explores the extent of integrating educational technology in contemporary classroom environment among the ASEAN Member States. Specifically, this study aims to describe the profile of the countries under study in terms of the total population, gross national income (GNI), literacy rating and ICT development index (IDI); educational technology integration in principle and practice as well as the barrier for its integration; and test the correlation among the profile variables.

#### **METHODS**

This study utilized qualitative analysis using Literature Research Methodology which is to classify information contained in literatures, to select typical examples to re-organize and come to conclusion on the basis of qualitative description. The qualitative analysis of literatures has special values in distinguishing the past trends and forecasting future models [7]. This study also applied inferential statistics to test correlation among the profile variable

of the countries. Local literatures on the status of integration of technology on these countries were also reviewed and investigated. Three papers from the report published by the UNESCO Institute for Statistics were reviewed and served as secondary source of data and information.

#### **RESULTS AND DISCUSSION**

##### **Profile of ASEAN Member States**

The profile describes the total population, gross national income (GNI), literacy rating and ICT development index (IDI) of developing countries among ASEAN Member States. These are considered some contributing factors in achieving the mission of quality education through integration of educational technology in contemporary classrooms in ASEAN community.

In terms of classification, there are 70 per cent of the ASEAN member-states considered developing countries and 1 per cent which is Myanmar belonging to undeveloped while Brunei is graduating to developed economy and Singapore to advanced/developed economy based on the Gross National Income per capita of World Bank national accounts data. There are so many improvements need to be addressed among the member states in order to reach the status of Brunei and Singapore as developed economy. The identity of each country in terms of population is also diverse wherein poverty is number one concern of the national government.

In terms of population, Indonesia has the highest total population among the ten ASEAN member states with 3.5 percent of world share followed by the Philippines and Viet Nam while Singapore and Brunei Darussalam obtained the least total populations which are considered developed countries among the member states. There is no reviewed literature that tells population of the country has significant contribution in the integration of ICT in education. But when two samples compared between one group with large population and the other one with small population, it is more manageable to provide instruction to smaller population and the attention to be given to each individual is higher than in a group with large population [8].

Gross National Income per Capita is also presented in the study to determine how countries performed over the other that could provide baseline information and insight as to reasons for the barriers of technology integration in education. Among the

developing countries, Malaysia has the highest Gross National Income per capita based on 2011 to 2014 World Bank national accounts data while Cambodia, Lao PDR, Myanmar and Vietnam obtained the least [9].

In terms of literacy rating among ASEAN Members States, Singapore obtained the highest rating of 96.8 per cent followed by Thailand (96.7%), Philippines (96.3), Brunei (96%) and Malaysia (94.6%). However, Viet Nam (94.5%), Indonesia (93.9%), Myanmar (93.1%), Laos (79.9%) and Cambodia (77.2%) obtained the least percentage among the ASEAN Member States [10].

### ICT Development Index 2015

The Information and Communication Technology (ICT) Development Index (IDI), which has been published annually since 2009, is a composite index that combines 11 indicators into one benchmark measure. It is used to monitor and compare developments in information and communication technology (ICT) between countries and over time [11].

The main objectives of the IDI are to measure the level and evolution over time of ICT developments within countries and the experience of those countries relative to others; progress in ICT development in both developed and developing countries; the digital divide, i.e. differences between countries in terms of their levels of ICT development; and the development potential of ICTs and the extent to which countries can make use of them to enhance growth and development in the context of available capabilities and skills.

The Index is designed to be global and reflect changes taking place in countries at different levels of ICT development. It therefore relies on a limited set of data which can be established with reasonable confidence in countries at all levels of development.

Singapore obtained an IDI value of 8.08 in 2015 followed by Malaysia (5.90), Brunei Darussalam (5.53), Thailand (5.36) and Philippines (4.57). However, Viet Nam obtained a score of 4.28 followed by Indonesia (3.94), Cambodia (2.74), Lao P.D.R. (2.45) and Myanmar (2.27) as the least group of countries in IDI 2015.

The ICT Development Index for ASEAN Member States shows that Singapore, Malaysia and Brunei are the top 3 countries with the highest IDI value in 2015 while Cambodia, Laos and Myanmar obtained the least values. The rank of Singapore in the world rank

drops from 11 in 2010 to 19 in 2015 as well as Brunei Darussalam from 53 in 2010 to 71 in 2015 while Thailand and the Philippines climb 18 and 7 spots, respectively for five years.

ICT Development Access Sub-Index 2015 captures ICT readiness, and includes five infrastructure and access indicators (fixed-telephone subscriptions, mobile-cellular telephone subscriptions, international Internet bandwidth per Internet user, households with a computer, and households with Internet access). Singapore, Brunei and Malaysia are the top 3 with the highest IDI access sub-index value in 2015 while Cambodia, Laos and Myanmar obtained the least values.

Singapore obtained the highest IDI value of 8.64 on 2015 for access sub-index among ASEAN Member States followed by Brunei Darussalam (7.25), Malaysia (6.61), Thailand (5.20) and Indonesia (4.60). However, Viet Nam (4.43), Philippines (4.39), Cambodia (3.77), Lao P.D.R. (3.03) and Myanmar (2.47) obtained the least scores [11].

The skills sub-index seeks to capture capabilities or skills which are important for ICTs. It includes three proxy indicators (adult literacy, gross secondary enrolment, and gross tertiary enrolment). As these are proxy indicators, rather than indicators directly measuring ICT-related skills, the skills sub-index is given less weight in the computation of the IDI than the other two sub-indices. Singapore, Thailand and Brunei are the top 3 countries with the highest IDI skills sub-index value in 2015 while Myanmar, Laos and Cambodia obtained the least values.

Singapore obtained the highest skills sub index value of 7.93 followed by Thailand (7.83), Brunei Darussalam (7.34), Philippines (6.97) and Indonesia (6.93). However, Malaysia (6.75), Viet Nam (6.54), Myanmar (5.22), Lao P. D. R. (4.94) and Cambodia (4.60) obtained the least scores in the skills sub index for 2015 among ASEAN Members states [11].

The use sub-index captures ICT intensity, and includes three intensity and usage indicators (individuals using the Internet, fixed broadband subscriptions, and mobile-broadband subscriptions). Singapore, Malaysia and Thailand are the top 3 countries with the highest IDI use sub-index value in 2015 while Cambodia, Laos and Myanmar obtained the least values. Singapore still obtained the highest value of 7.61 in the use sub-index followed by Malaysia (4.76), Thailand (4.28), Philippines (3.55) and Viet Nam (3.01). However, Brunei Darussalam (2.90), Indonesia (1.79), Cambodia (0.78), Lao P.D.

R. (0.64) and Myanmar (0.58) obtained the least scores [11].

### **Barriers for Integration**

Many aspects are being considered in making technology integration possible and measuring its impact could hardly get a few from the rest of the developing countries in ASEAN member states. It is always easier said than done those plans of integrating innovations in teaching and learning process. Some of the probable causes of educational technology integration in most developing countries are: inadequate financial support and infrastructure, human capital, management support, as well as behavioural and environmental aspects.

Economic strength or financial capability of developing countries is considered one of the major challenges in the integration and even the rest of the world. Lack of appropriation for ICT due to corruption and strong influence of politics might be some barriers to believe as reasons. Most organizations and industries from developed countries are giving out their support to alleviate the digital divide among nations. But only few stayed focus and committed from the beginning of the project until it has produced impact to the community and society at large. Huge amount of funds and human resources should be invested in such projects to become sustainable. Providing schools with the computer units without access to internet and other communication media could not serve its purpose into full extent.

Teacher preparation is insufficient [4]. The workforce must be well-equipped with the skills necessary to provide effective transfer of knowledge from the teachers and learners. Such technology is being used to support the delivery of instruction and to train students on how computer works and its fundamental operation as well as its applications in the development of an informed and educated community.

The infrastructure or facility where to place donated computers in an environment that can ensure temperature conducive to preserve the functionality of computer system is another story. The bill of the school will also increase and it will add up to their expenses. If the management will not adequate support in the utilization of computers in the delivery of instruction, conflicts will occur at times. Policies should also be clearly written and well-established for proper implementation and guidance of teachers and students.

Rural youth for whom the Internet is more aspiration than avocation and whose schools may not even have electricity, let alone a computer, or for whom 'computer time' means the two hours a month spent in a crowded school computer lab learning how to use a word processing program while waiting, waiting, waiting for their desperately slow Internet connection to bring up a single web page: Such young people and circumstances represent the reality of current technology use in education across Asia as well [12].

In order to gauge national capacity to support the integration of ICT in education, measuring the share of educational institutions with electricity and a telephone communication facility provides basic information for policymakers to assess current gaps in infrastructure, as well as help inform decisions about which ICT tools would be appropriate for short- and longer-term planning.

Telephone communication facilities are more or less universal wherever electricity is widespread. However, in Malaysia, which has electricity in all schools, telephone communication facilities are just available in 88% of primary schools and 76 percent of secondary schools. In countries where electricity remains a challenge, telephone communication facilities are also typically less than universal. For example, telephone communication devices are present in 14 percent of primary-level and 38% of secondary-level schools in Lao People's Democratic Republic. Telecommunication devices are also uncommon in some schools with relatively high levels of electricity, for example in the Philippines. While privately-owned mobile telephones are excluded from the current definition, mobile units are increasingly used by teachers in developing countries for both pedagogical and administrative purposes [13].

There are numerous constraints on the use of ICT within Myanmar generally and within the education sector specifically: Lack of infrastructure, Lack of financial resources for ICT education, limited access to and awareness of ICT [3]. In Cambodia, there is lack of financial resources, weak telecommunications policies and infrastructure, lack of basic education infrastructure, lack of ICT human capital and difficulty of computerising the Khmer script. Meanwhile, in the process of carrying out developmental work on ICT for education in Thailand, many issues and problems arise that require appropriate remedies.

In Cambodia, as with many countries, computers are not well integrated into classroom learning. The cost of equipment is high, electricity costs can be prohibitive, and maintaining the equipment can be problematic [14].

Furthermore, since many areas in Cambodia have limited electricity—and many schools cannot afford the electricity costs that conventional labs require Improved Basic Education in Cambodia Project (IBEC) installs solar panels to run each of the labs. The low energy consumption and solar panels reduce energy use and minimize running and maintenance costs, making the thin client labs not only cost-effective, but also a sustainable solution to providing students with access to technology [14].

In revealing problems the schools encountered with the Thin Clients labs, every school surveyed cited maintenance problems and energy costs as the top two problems [14]. Using technology to link education with teachers and students has come at a critical time where most Cambodian schools do not have sufficient amount of teachers to balance out the increasing school-age population [15].

In the study of Richardson [16] revealed that the biggest challenges to adopting the use of new technologies in Cambodia were hardware incompatibility; complexity; language barriers; the lack of electricity, computers, Internet access, and of practice for trainees; and the inability to understand the advantages of these technologies.

Naturally, in the best of all possible worlds, educational institutes could provide unlimited ICT support, but the reality is somewhat different as limited fiscal resources slow progress toward ICT implementation. Moreover, availability does not necessarily equate with usage [17].

As in other developing non-English speaking countries, constraints on ICT use in education seem to be related to content and access. Specifically, significant problems in Viet Nam include: the lack of Vietnamese language software for use in educational applications. This effectively restricts the likely user population for the Internet to the 10 per cent or so of Vietnamese who understand some English; limited ICT facilities that do exist have not been effectively used in general teaching, training and educational management; limited access to Internet for education due to high cost of access; and lack of qualified personnel, including trained teachers [1].

Even though the Philippine government has initiated several programmes and projects for the use

of ICT in education, real implementation in day-to-day learning is still limited. Teachers' fear of technology still hinders the optimal use of ICT-related skills in their teaching activities. Other constraints include the traditional mindset of the school principals, inadequacy of ICT facilities, the lack of adequate maintenance of the available/existing ICT resources, dependence for financial investment on the central government and dependence on ICT service providers for software/courseware [18]. Despite various training programmes having been provided to teachers, there is still a need to embark on a comprehensive and sustained in-service training for teachers. Likewise, a systematic development programme for education managers needs also to be implemented to change the mindset of principals so they appreciate the value of ICT in education [19]. Considering the lack of technical staff for maintaining computers and computer networks, as well as providing user support for Internet-related activities, lease arrangements rather than procurement should be explored as an alternative. Another constraint that has had a significant impact on the use of ICT in classrooms is the availability of courseware.

In Indonesia, there is no national strategic plan for implementing ICT in education. All the initiatives have been conducted as project-based activities, which tend to be ad hoc, unsustainable and without long-term goals. Due to financial difficulties, government priority in basic education has been put on the rehabilitation of school buildings, teacher training on the pedagogical aspects of teaching and on teachers' welfare. ICT for education has, therefore, not yet been considered a priority. Hence, even though some teachers have been trained to use ICT in their teaching activities, they cannot use their new skills because of the lack of facilities (hardware). Moreover, the number of teachers who have been trained is very small in relation to the total number of primary and secondary school teachers in the country.

The major factors perceived to inhibit the growth of ICT use in Malaysian education is described by Lee Huei Min, Senior Analyst with IDC Malaysia, as "the cost of Internet access, which includes the cost of hardware, access and knowledge [and the stagnant] Internet experience...as broadband Internet applications are yet to be deployed." Another constraint that seems to hinder the actual use of ICT in classrooms is the lack of teachers' ability to integrate ICT-related skills they have learned into their teaching activities [20].

**Table 1. Correlation Matrix of the Profile of ASEAN Countries**

		Classification	Population	GNI	Literacy	IDI
Classification	Correlation Coefficient	1.000	.208	.915(**)	.817(**)	.895(**)
	Sig. (2-tailed)	.	.565	.000	.004	.000
Population	Correlation Coefficient	.208	1.000	.273	.030	.273
	Sig. (2-tailed)	.565	.	.446	.934	.446
GNI	Correlation Coefficient	.915(**)	.273	1.000	.830(**)	.915(**)
	Sig. (2-tailed)	.000	.446	.	.003	.000
Literacy	Correlation Coefficient	.817(**)	.030	.830(**)	1.000	.842(**)
	Sig. (2-tailed)	.004	.934	.003	.	.002
IDI	Correlation Coefficient	.895(**)	.273	.915(**)	.842(**)	1.000
	Sig. (2-tailed)	.000	.446	.000	.002	.

\*\* Correlation is significant at the 0.01 level (2-tailed).

There is a significant relationship between country classification and the GNI, Literacy Rating and ICT Development Index with p-values less than 0.01. It is expected to have very high correlation between GNI and country classification because country classification depends on GNI while in terms of Literacy rating, those countries with high GNI have also high Literacy rating and ICT Development Index Rating. This signifies that the development of educational technology and literacy rating of a certain country depend on its Gross National Income. However, country population is not a factor that influences GNI, Literacy Rating and IDI. No matter how large or small the population will be as much as the country has the capability to manage its GNI, all people can be served equally.

## CONCLUSION

Majority of the ASEAN member states belong to the classification of undeveloped to developing countries. Only Brunei Darussalam and Singapore are considered graduating to developed economy and advanced/developed economy, respectively. Indonesia and Philippines have the highest total population while Singapore and Brunei have the least population but with the highest Gross National Income per Capita. In terms of literacy rating, Singapore, Thailand and Philippines obtained the highest percentage more than 96 percent while Laos and Cambodia obtained the least with less than 80 percent. Singapore has the highest ICT Development index Value while Myanmar obtained the least.

Malaysia and Vietnam have the highest percentage of GDP in expenditure on education while the Philippines obtained the least percentage. Available computer resources are greatly

overstretched in the Philippines (412:1) at the primary level while based on combined data for the primary and secondary levels, computer resources are also greatly overstretched in Indonesia (136:1). The use of technology is a burgeoning trend in all higher education [21] but has limited use in basic education.

Many secondary classroom teachers and academic administrators remain uncertain on how to implement new technologies to replace out-dated forms of classroom instruction. By relying on technology that is not completely understood [22], its potential benefits could be attenuated [23]. Some of the probable causes of educational technology integration in most developing countries are: inadequate financial support and infrastructure, human capital, management support, as well as behavioural and environmental aspects. There is electricity divide [12] between rural and urban areas in some parts of the country. Therefore, availability of electricity is also one of the problems facing by the school administration.

Gross National income is considered a factor that can directly or indirectly influence the Literacy rating and ICT Development Index value of the country while the total population based on ranking of countries has nothing to do with the ranking of GNI, Literacy Rating and IDI value of each country.

## RECOMMENDATION

The issue of digital literacy among developing countries will continue to become subject of discussion until such time that the initiative of ICT integration in education will be coming from the school administration itself within the capacity of local community rather than from the national level. Positive views should be encouraged among the

members of faculty and community to solicit support from the environment [24], [25] especially from the local government units and non-government organizations.

The support of the government and private industries is well-rounded but the challenge of sustainability of ICT in education exists among the end-users on how they will improve the knowledge and skills acquired from the equipment and training provided to them is another part of the issue needed to address. The attitude of the people towards innovation has a great impact towards the achievement of the mission of having quality education through ICT integration. Transforming the approach of teaching and learning process to develop positive attitude with the support of educational technology could be of help to teachers in maintaining the interest of the students to participate in any classroom activity.

There are times the overuse of educational technology on the same manner may result to “novelty effect,” in which once a new technology becomes standard, students no longer find it exciting [26]. Various teaching pedagogy [27], [28], [29] with appropriate creativity should also be developed in using educational technology in delivering instruction.

If something has been already served and implemented, the next major concerns of the beneficiaries are the maintenance and sustainability of the projects where monitoring has an utmost importance. Learning how to protect the computer system and facilities from any kind of destruction would be helpful to reach the life span of the equipment or any electronic device.

The cooperation among the ASEAN member states could still be strengthened through mutual agreements and establishing international policies in education that would cater to the needs of developing countries in the integration of educational technology to help each other in the journey towards the realization of the vision of the ASEAN Economic Community in 2025.

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