

# Smart functional literacy using ICT to promote mother tongue language and inclusive development of ethnic women in the North Region of Thailand

1<sup>st</sup> Kamolrat Intaratat, 2<sup>nd</sup> Piyachat Lomchavakarn, 3<sup>rd</sup> Eng Tek Ong,  
4<sup>th</sup>,5<sup>th</sup> Khar Thoe Ng, 6<sup>th</sup> Subuh Anggoro\*

[kamolratchim@gmail.com](mailto:kamolratchim@gmail.com)<sup>1</sup>, [ningpiyachat@gmail.com](mailto:ningpiyachat@gmail.com)<sup>2</sup>, [onget@ucsiuniversity.edu.my](mailto:onget@ucsiuniversity.edu.my)<sup>3</sup>,  
[postgradtask@gmail.com](mailto:postgradtask@gmail.com)<sup>4</sup>, [subuhanggoro@ump.ac.id](mailto:subuhanggoro@ump.ac.id)<sup>5</sup> }

<sup>1,2</sup> Sukhothai Thammathirat Open University (STOU), Thailand

<sup>3,4</sup> UCSI University, Kuala Lumpur, Malaysia

<sup>5</sup> Asia e University, Selangor, Malaysia

<sup>6</sup> Universitas Muhammadiyah Purwokerto, Central Java, Indonesia

**Abstract.** This article reports on the results of a participatory action research on the socio-economic status, the smart functional literacy, and ICT literacy of ethnic women in the North of Thailand. The study also examined the feasibility of smart functional literacy for inclusive development with a focus on gender and priority demands, and investigated the situation of mother tongue language and its integration with smart functional literacy for better living. Qualitative research methods were used, including documentary studies, interviews, focus group discussions, observations, and participatory training and workshops. The first finding revealed that within the three main contexts of ethnic women: (1) most of them come from mountainous farming families and receive primary education in their communities; (2) smart functional literacy, particularly when embedded with ICT, was well-liked by participants; (3) mother tongue language literacy was decreasing in significance compared to Thai, English, and Chinese languages; and (4) ICT literacy was most accessible and beneficial via smartphones and social media. The second finding indicated that Smart Functional literacy could facilitate gender balance and support all key languages. The top three demanded contents were entrepreneurship skills, Thai language, and smart farming. The third finding shows that integrating smart functional literacy with mother tongue language improved participants' awareness, facilitated their integration with ICT and heritage and crafts, and enabled inclusive development that met all demands of ethnic women, including their mother tongue, resulting in increased pride in storytelling and confidence.

**Keywords:** ICT, smart functional, mother tongue language, inclusive development, Thai ethnic women

## 1 Introduction

The current situation under various disruptive contexts i.e digital technologies, COVID-19 and others affecting all including the ethnic groups in Thailand. The remaining tangible ethnic groups in North of Thailand are the “Lau” who stay in the highland with small farming, the “Mhong” with skills of being the local entrepreneurs especially in all kinds of local farm products and heritage crafts, and the “Malabri” and the “Khamu” respectively. Under the tribal natural resources, environment, mother tongue, heritage, and culture, there are still challenges due to continuous disruptive changes, especially the digital technologies disruption into their local lives.

Various researches relevant to ethnic women empowerment in Thailand such as the functional skills, the functional languages, "mother tongue" or local languages, etc. especially about the mother tongue language which seem to be disappearing under all kinds of disruptive changes and challenges even of the global declaration to be “The Year of Indigenous Languages (IY2019)” by the United Nations 2019 aims to raise the global awareness of the mother tongues globally including Thailand [1].

Besides, the UN also keep supporting all kinds of promoting the mother tongue uses globally besides from its only conservation dimension. One among the key strategies and approaches globally used is “the functional learning.” The gap of functional language has been transitioning from their mother tongue to be the common Thai language for all functional roles in their daily lives especially for all communication and well recognitions among other partners in the society. Because they communicate freely among their own tribes and also all the outsiders.

The disappearing situation of mother tongue languages occurring around the world, even various researches have been emphasizing how important of all the mother tongue languages particularly in the context of the tribal communities and indigenous peoples [3][4][5]. Studies have shown that mother tongue-based multilingual education can improve learning outcomes, preserve cultural heritage, and promote social inclusion and equity [6][7][8][9]. Additionally, the integration of ICT and smart functional literacy with mother tongue language can further enhance its value and relevance in the digital age [10]. Thus, this study highlights the need for continued efforts to promote and preserve mother tongue languages and to integrate them with smart functional literacy for inclusive and sustainable development in ethnic communities.

With all the relevant reasons of how important of the mother tongue languages globally which reflecting all kinds of human beings' dignity, heritage and pride. Under all the surrounded existing challenges with the ICT disruption, this study aims to study how ICT can facilitate all kinds of integrated transitions among any mother tongue language embedded by the smart functional literacy, and all the current demands of the ethnic women for their inclusive sustainable development especially the ethnic women in Thailand.

## **2 Literature Review**

This section of the literature review (1) the concept of smart functional literacy [11]; (2) the importance of mother tongue language and ethnic groups with their unique cultural identity, diversity, and sustainable development, which promotes linguistic diversity and protects mother tongue languages, and (3) the Massive Open Online Courses (MOOCs) (2021; undated) as a free online learning platform that provides accessible and flexible education for people worldwide, especially in response to the COVID-19 pandemic [13]. MOOCs have gained popularity and offer a diverse learning community for learners to interact and collaborate with each other [14].

Smart functional literacy refers to how to use ICT to facilitate all kinds of required practical skills, i.e., skills of reading, writing, and calculation for ethnic girls and women in their real-life demands. Functional learning is an approach to learning that emphasizes the practical application and real-world relevance of knowledge and skills. In other words, functional learning would focus on teaching students how to use what they learn in meaningful ways, rather than just acquiring knowledge for the sake of knowing it. Functional learning could involve activities, projects, or problem-solving exercises that simulate real-life situations, enabling learners to apply their knowledge and develop practical skills. This approach is believed to enhance retention and understanding as learners can see the direct relevance of what they are learning to their daily lives and future careers.

With its tangible concepts, functional learning has become more recognized and applied into a specific concept such as the mother tongue language. How to integrated all surrounding demands and contexts with each own tribal mother tongue languages. Some of the functional skills demanded among most ethnic women are:

- a. Health Literacy: The ability of ethnic women to have enough knowledge and skills for their daily fundamental healthcare activities affecting to all all fundamental quality of life;
- b. Citizen Literacy: The ability of ethnic women to access to all kinds of their leaders, their local government, their duty, their rights and responsibilities as a member of the society;
- c. Religious Literacy: The ability of ethnic women to understand, interpret, behave, and help transfer their religious or beliefs among others. Religious literacy is important for all kinds of negotiating changes, challenges, and all kinds of mutual understanding, either inside their own ethnic groups and the others;
- d. Financial Literacy: The ability of ethnic women to manage finances and make decisions about their own or their family investment, budgeting, interest earning, and savings, etc;
- e. Legal Literacy: The ability of ethnic women to access and understand all kinds of relevant laws and regulations so that they can stay with others with mutual understanding and justice;
- f. Media Literacy: The ability of ethnic women to access to any kind of information relevant to their life and works. Besides, they could also create and contribute any kind of their own information for all the benefits of their own quality of life;
- g. ICT Literacy: The ability of ethnic women to use ICT for their inclusive development. At least, they must have the fundamental ICT skills and knowledge to use or to apply any kind of ICT tools for all the benefits of their own life and needs;
- h. Legal Literacy: The ability of ethnic women to understand all the relevant rules, regulations, laws those are relevant to their safety, security, and benefits;
- i. Scientific Literacy: The ability of ethnic women to understand, analyse, identify evidence, explain with reasons or evidence that supports or contradicts any event, belief, etc.

**Mother tongue language and ethnic group:**

United Nations celebrate the Indigenous Languages to be its International Year in 2019 to declare as the fundamental human rights, freedoms, liberal of all humanbeing under the SDGs context. All humandbeing must have their basis right to chaosse their own language, their own contents, their own interest, their own thoughts in doing all things in their daily life for inclusive development of self, community, and societies as a whole. This will affacted to all achievement of the United Nations Declaration on the Rights of Indigenous Peoples and the SDGs 2030 (<https://en.iyil2019.org/about/>).

Any language could be trained, could be learned under the “ open ” scenario of life long learning. The global emerging Massive Open Online Courses (MOOC) has been developing globally affecting to locally to serve for all inclusive education for all as well as lifelong learning to all too. The main philosophy of MOOC is “ free ” with its availabilty to all aims to cope with all kinds of any disrupted changes currently. MOOC has backed up with all

kinds of Open Educational Resources (OER) which could be contributed by any relevant stakeholders. Meaning that MOOCs are not limited to traditional academic subjects, but can cover a wide range of topics [15].

MOOCs have gained popularity in recent years, especially in response to the COVID-19 pandemic, as they provide a convenient and accessible way for people to continue learning from the safety of their homes. They also allow for learners to interact and collaborate with other learners from all around the world, providing a diverse learning community.

There are many different MOOC platforms available, including Coursera, edX, and Udacity, among others. Each platform offers its own unique features and content, but they all share the same goal of providing free and accessible education to anyone with an internet connection.

Overall, MOOCs have the potential to revolutionize education by making it more accessible and flexible. They provide a powerful tool for lifelong learning and skill development, allowing people to learn at their own pace and on their own terms as revealed from literature [16][17][18].

This research aims to explore the context and feasibility of Smart Functional Literacy and its potential impact on the inclusive development of ethnic women in the North region of Thailand with its aims to study;

- 1) The context of ethnic women in the North region of Thailand;
- 2) The feasibility of Smart Functional literacy in promoting the inclusive development of ethnic women in the North region of Thailand, with a focus on gender aspects and priority demands;
- 3) The situation of Mother Tongue Language and its transition, facilitated by Smart Functional Literacy, towards better living and inclusive development.

### **3 Methods**

The participatory action research for development, employing a qualitative approach [19]. The study began with a documentary study, interviews, focus group discussions, observations, and a participatory approach through participatory training and workshops. The key informants included three leaders of the ethnic women from three main ethnic groups and thirty stakeholders from all three ethnic groups : leaders, teachers, development workers, staff of the local administrative bureau, and gender specialist.

### **4 Finding and Results**

#### **4.1. Situation of the ethnic women in North region of Thailand: Tribal demography, Smart functional skills, Language and ICT skills**

**Case 1**—Ms. A: the 18 years old ethnic girl from Lau tribe. She is from Ban Peenpha village along the borderline between Thailand and Myanmar. The village is under the Natural Conservative area as being the upstream watershed area of Northern region of Thailand. The villagers allowed to do only farm for a living. In general, all the women in the village can not access to all formal schools because of its remoted areas. But currently, some of the Non-Formal education units could be more accessible in the village and nearby. She left school at 9 years old to help the family farming then got married with 3 kids currently.

**Smart functional skills:** Ms. A used to be trained under the Women Empowerment Functional Literacy Project because of her fit qualifications with the project such as being a mother of 3 kids, being the young mother, and can communicate in Thai language. After got the Functional Literacy training, she gains more knowledge and skills in all keys functions demanding for the better life of the quality of life such as the life planning, the career planning and income, the saving technique, the sanitary and safety for her own life and the whole family members especially her kids and her elderly members of the family.

**Language skills:** “My Thai language is quite ok now, then I plan to improve my ability of language, which is English because I think that it is necessary to be able communicating in English with tourist as a tour guide. So, my future career might be a guide in my community”. “I usually help my teacher whom mobile to teach us at the community hall, so, it is really fasten my Thai language’s learning”.

**ICT skills:** Ms. A is the key person of the family who use the smart phone. She use smart phone for all purposes of life, for all the family serves, and for all her neighboring services too. She can use more applicable functions of the smart phone including some entertainment such as Thai TV programs from various of social media platform. “If I can get the better education, I want to be a medical doctor even if only a dream, but I love it. I also want to be the successful business woman with lots of money, etc. then I can use that money to send my kids to school, to send my elderly members to any good hospital.

**Case 2**—Ms. B: the 18 years old Karen ethnic women from Ban Tamaka village. She has 10 members in her family starting from herself, her brothers, sisters, grandparents, father, and mother. Ms. B has never been allowed to go to school and even any public event except only the special tribal event such as the tribal New Year, the farm activities.

“I only use my own language, I can only speak or communicate among my family members and my nearby tribal people in the village.” “I got married when I was 16 years old and currently has one daughter, I live with my family. So, currently we have 11 members in my family” “We are doing the rice and corn farms upon the nearby mountain”.

**Smart functional skills:** Ms. B is active and open for all new learn because she wants to be one among the voices in the family. Because she is the wife of the eldest son of the family and her husband is too quiet. “I my kid to go to school even though I have never experienced

any schooling before. I believe that education or schooling can change our lives for the better," said Ms. B.

**Language skills:** Even though she has never attended any school, Ms.B can function herself as one of the leader of her big family. With the role of the family leader, she keeps trying to practice other languages besides from her only mother tongue language. She use her smart phone to learn Thai language, Chinese and some of the communicating English because of some foreigned toursits into the village. "If I can write Thai as I communicate, I am sure that myself and my family can access more benefits and even protect ourselves, our properties, and our community as a whole."

**ICT skills:** Smartphone is the only digital tool for herslef and her family and even her neighbors and others in the village. She used to seek infromation for her own family and her village members about the price of the farm products, the seeds of corn, rice and others. With her communicating role, she becomes be be the "family voicer". "My husband and my mother-in-law listen to me more. I am grateful to my smartphone because they listen to me more, ask me more, and consult with me more." "Anytime I can meet anyone who seems to know about ICT, I always ask them for more techniques and other functions to be the best-known in ICT for my family and my community as a whole too."

**Case 3** – Ms. C is the 22 years old with her Yao tribal born with 7 members in the family in Klang village next to the top watershed area of Thailand. Her viallge is very high land with mostly corn farm and sticky rice farms. Ms. C never got any chance to go to school because all the fmaily members have to work in the farm. Some girls are allowed to work at home or in the lower farm land. She got married at the age of 18 and now has 2 sons. Corn products and some herbs are the amin income of her family.

**Smart functional skills:** Ms. C never got any chance to access to any physical training or any empowering program. She mostly not be allowed to get out from home, she mostly go out with her family members. But since her sons grown up a bit, she can be more freely to get out with her sons such as going to the market, going to some of the village events. "I am very happy and relaxed to get out home from time to time to see more of the outside world, use my mother tongue language, listen to others' stories, both inside my own community and outside. "I have heard about the Functional Program for Women Empowerment, some of my female friends attained it , I have seen that they have changed, they can speak more effectively, they can speak other languages, they can do some other new things, etc."

**Language skills:** The only language that Ms. C uses is her mother tongue, her husband and father in law can speak Thai language as well as some Chinese and English. "Thai and English languages are becoming more and more important now because we must use them to

sell our farm products, and we don't want to pay any middleman. And for English, we want to earn more from all the tourists who keep coming into our community and many of them stay in our homestays, drink our coffee, and eat our food..."

**ICT skills:** Smartphone is my handy tool, I can use it for everything. " My life gains more betterment because of the smartphone ". After, I can use my own smartphone, all my attitude about ICT has been fixed to be correctly because "My understanding of ICT is that it is a big computer that I cannot use. Our community has unstable electricity, and most importantly, it is expensive, and I really don't know what to do with it." Therefore, Ms. C uses only a smartphone, but she uses it quite comprehensively: communicating, negotiating about farm products, reporting the farming process among all stakeholders, and keeping up-to-date with news and entertainment for herself and her family. "Whenever there is breaking news, my husband asks me to search for it, and I warn the other family members about floods, forest fires, droughts, irrigation, storms, epidemics, etc."

#### **4.2. Smart Functional skills situation and their feasibility for ethnic women in the North region of Thailand: Gender dimension and priority demands**

Table 1: The functional literacy skills that have a high role in the family's perspective of ethnic women in terms of gender aspect. The ranking of the skills is based on the percentage of their importance in the family's perspective, from the highest to the least. Additionally, the table also provides an overview of the skills that are most valued by the family members, especially male leaders, and how they can contribute to the family's income and farm production. The skills range from language proficiency, communication, digital technological skills, and management abilities.

<b>Ranking (Top to least)</b>	<b>Functional literacy skills (Gender aspect)</b>	<b>Role in family (%)</b>	<b>More explanation</b>
1	Thai Language literacy as well as other functional languages	67	They can be included in the lowland society where people use Thai language.
2	Can earn more money i.e. can create other income generating activities, etc	65	More income would be very precious for the whole betterment of the family, women voices would be more heard and admired.
3	Can produce more farmproducts and farm development	63	Can help and contribute to the farm production.
4	Can do the family planning and management	62	Can be voiced in family planning and management (farm investment, market, etc.)



5	Can communicate with the others outside the village	61	For their confidence, education, dignity, and all kinds of income generating activities i.e. tourism, trading, etc.
6	Can do some basic accounting	60	Calculation and accounting is one among the key factors for their farms trading; product selling, marketing plan, farm investment and development.
7	Can use ICT especially the digital tools for fundamental functions	55	ICT tools for communication, marketing, coordination, information accessibility, and knowledge sharing.
8	Can use English and maybe other languages i.e. Chinese language	52	For tourism purpose and others especially for communication.
9	Know some farm technology, smart farm practices	51	For more effective farm production and farm development
10	Know some other language i.e. Chinese language as well as other functional demanded languages	51	For tourism and trading communication purposes.

---

Table 2 provides information on the functional literacy priorities of ethnic women. These priorities are ranked based on their demands and the percentage of women who consider them important. The table shows that smart farming and nutrition are the top two priorities, followed by sanitation and language skills. Entrepreneurship skills and earning extra income are also important to women, as well as using ICT for communication and innovation for farm production. The table provides valuable insight into the specific functional literacy skills that are important to ethnic women, which can help inform policies and programs aimed at improving their education and opportunities.

<b>Table 2. Functional literacy on the ethnic women: Priority demanded aspects</b>			
<b>Ranking</b>	<b>Functional literacy (Priorities demand)</b>	<b>Priorities (%)</b>	<b>More explanation</b>
1	Smart Farm especially for more effective and productive farming system	66%	More income from farming is the most demands of the whole family because it is the main income of the family.
2	Wellness and healthy of the family's conditions	65%	Women is one of the key wellness of the family because women prepare all food, clothes, children and elderly of the family.
3	Healthy and green environment	62%	Family holistic wellness also healthiness included.
4	Common language i.e. Thai, English and Chinese languages are demanded.	60%	They all want any kind of functional language for their survival and better quality of life.
5	Marketing	59%	Want more skills in marketing and being entrepreneurs.
6	Want more income generating activities	56%	To be add up more income for the family besides from the only farm income.
7	ICT skills, and demanded information accessibility	53%	To be more skills to any lacking: information, news, innovation, welfare, etc.
8	Any farm technology and innovation followed by any further job for more income generations	52%	For more productive in their farm prediction.
9	Calculation, Accounting, Numeracy	51%	For their farm products' marking, and farm development as a whole especially in farm investment.

10	More productive, creative, "How To" technic, knowledge and skills	50%	"How To" Marketing, "How To" setting up and managing the e-Shop, etc.
----	---	-----	---

The Contexts of Mother Tongue Language Facilitated by Smart Functional Literacy through Storytelling. The "Contexts of Mother Tongue Language" refers to the overall situation and process of utilizing the Mother Tongue Language of all ethnic groups as a means to empower girls and women in transferring their local wisdom, heritage, and crafts based on their own creativity through story-telling, as illustrated in Table 3. to transfer their local wisdom, heritage, and crafts based on their own creativity through story-telling, as shown in Table 3.

**Table 3. Content Analysis from Story -Telling of the ethnic women in the North Region of Thailand (gender, local wisdom, Mother Tongue, leadership)**

Reflective Dimensions	Yes	No	Details
1. Gender dimension?	5	1	–
2. Leadership dimension?	1	5	–
3. Male dominant?	6	–	–
4. Female value recognized?	4	2	–
5. Male value recognized?	5	1	–
6. Reflecting : local wisdom, mother tongue, racism, social status, environment, etc.	2	4	–

Content analysis from all the story telling created by all the ethnic women shown in Table 3, still reflecting the main dimension of male dominant, female roles both in the family, in the farm, and in their tribal community. Besides, their stories also reflecting all the current situation of the community i.e the cultural dimension, the environment dimension, the social status dimension, etc. For the gender aspect, even of the dominant of a male-dominated status, but it appears to be more balanced of female status in the current situation.

## 5 Conclusion

The study on “Smart Functional Literacy Using ICT to Promote Mother Tongue Language and Inclusive Development among Ethnic Women in the North region of Thailand” yielded the following main findings:

The situation of the ethnic women in the North region of Thailand found: (a) mostly are the primitive small farmer in the mountainous area where is the upstream watershed area with forest-base context of Thailand. Marjority of tribal women are married with average 16-21 years old with their generally no or least formal education. More increasing formal education into the tribal villages by the Non-Formal Education kiosks and even mobile units in general (if their families allow); (b) The Smart Functional Literacy program found that most ethnic women are curious and open to learn for any betterment of themselves and their families i.e. the Functional Literacy program, the farm training, the sanitary training, etc.. "I need better chances in life by improving my occupational skills". "If I can get better education, I want to be a nurse, or maybe open my own shop by selling hand- made silver."; (c) Language skills: "Thai language must be learned because if we can use it, it would be easier for us to trade, negotiate, and coordinate with others."; (d) ICT skills: "Smartphone is our handy tool, smartphone can facilitate everything that we want for us now. We can communicate freely compared to before because it is more affordable and accessible." "Social media tools are very important for us: Facebook, Line application, YouTube because we can also learn Thai language from all these media." "Being able to use a smartphone to access any urgent or important news really adds value to me. My husband and other family members listen to me more and even ask me to search for more information. I am so happy and feel empowered."

Smart Functional Literacy situation relevant to the ethnic women are as follow: (a) Gender dimension found gender balance is still challenging, but it seems to be better if women

can have more effective Functional Literacy in some of the functional income generating, and languages i.e. Thai language, can earn more income, and can make effective contributions to their farming respectively.; (b) Priority demands: found top demands respectively are smart farming, wellness, Thai language and digital communication as well as any kind of applicable digital tooling.

Therefore, if we can support ethnic women with ICT tooling, they can use it for self-learning and training through Smart Functional Literacy mindset and skills. Ethnic women can integrate all their demands with their own local wisdom, creativity, Mother Tongue, and community resources. Moreover, it enables them to transit their Mother Tongue into other demanded functional languages especially the digital language with their well-integrated storytelling that reflects their demands, identity, local wisdom, Mother Tongue, and lifestyle with pride and inclusive sustainable development.

## References

- [1] Communication and Development Knowledge Management Centre (CCDKM): The Expertise Research Centre in ICT for Marginalized in Thailand, STOU. (2018). Retrieved from <http://www.ccdkm.org>
- [2] RakThai Foundation, Nan Province, Thailand and Intaratat, K.: Report on Ethnic Girls and Women Empowerment through Functional Literacy in Northern Thailand's Nan province. (2021).
- [3] United Nations.: 2019 the Year of Indigenous Languages (IY2019). <https://en.unesco.org/news/2019-international-year-indigenous-languages-belaunched-month-unesco>. (2019).
- [4] Norwaliza, A. W., Goh, S. C., Ong, E. T., Mohd Hairry, I., & Haryanti, M. A. Construction of the forest school framework based on indigenous knowledge in Malaysia. *Cakrawala Pendidikan*, 39(2), 269–278. (2020).
- [5] Intaratat, K.: Smart Functional Literacy (CCDKM). (2021).
- [6] Ong, E. T., Mohd Hairry Ibrahim, N. A. Wahab, S. M. Salleh, C. K. S. Singh, & M. T. Borhan.: Contributing factors for academic success in this globalised era: Voices from the successful Orang Asli in Malaysia. *The Journal of Social Sciences Research*, 4(12), 625–632. (2018).

- [7] Ong, E.T., Ng, K.T., Charanjit Kaur Swaran Singh, Mohd Hairi Ibrahim, Nurulhuda Abd Rahman, Norwaliza Abdul Wahab, & Fauziah Mohd Sa'ad.: Investigat–ing the Attitudes toward Science among the Secondary Students of Orang Asli and Mainstream Ethnicities in Malaysia. *Review of International Geographical Educa tion*, 11(9), 2497–2509. (2021). <https://doi.org/10.48047/rigeo.11.09.21>
- [8] Ng, K.T. & Ng, S.B.: Exploring factors contributing to science learning via Chinese language. *Kalbu Studijos*. Vol. 8, pp.50–57. (2006). <https://www.cceol.com/search/ar–ticle–detail?id=196182>
- [9] Benson, C., & Kosonen, K.: Indigenous and community language education. In R. Kirkpatrick (Ed.), *The Routledge handbook of language education policy in Asia* (pp. 233–251). Routledge. (2020).
- [10] Intaratat, K.: Enhancing digital economy participation for ASEAN women MSMEs. Pacific Women's Information Network Center (APWINC). (2021).
- [11] Maldonado, N., & Stritikus, T.: The power of bilingual education: Preserving indigenous languages and building human capital in Peru. *International Journal of Educational Development*, 78, 102234. (2020). <https://doi.org/10.1016/j.ijedudev.2020.102234>
- [12] Liu, Y., & Kunnan, A. J.: *Smart education and smart language: Theory, re–search and application*. Springer. (2019).
- [13] Kumar, P.: Smart functional literacy for inclusive development. *Journal of Ethnic and Cultural Studies*, 4(2), 54–63. (2017).
- [14] IYIL: About International Year of Indigenous Languages (IYIL) 2019. (2019). Retrieved from <https://en.iyil2019.org/about/>
- [15] Massive Open Online Courses (MOOCs): UNESCO. (n.d.). Retrieved from <https://en.unesco.org/themes/higher–education/massive–open–online–courses–moocs>
- [16] Ng, K.T.: Making the challenges possible through Education Superhighway: A pilot project to motivate young learners towards Problem–based Learning (PBL) using technological tools. Presentation during the 23rd ICDE world conference on Open Learning and Distance Education, 7–10 June at Maastricht, The Netherland. (2009). URL: [https://www.researchgate.net/profile/Khar–Ng/publication/237272408\\_Mak–ing\\_the\\_Challenges\\_Possible\\_through\\_Education\\_Superhighway\\_A\\_pilot\\_pro–ject\\_to\\_motivate\\_young\\_learners\\_towards\\_Problem–based\\_Learning\\_PBL\\_using\\_](https://www.researchgate.net/profile/Khar–Ng/publication/237272408_Mak–ing_the_Challenges_Possible_through_Education_Superhighway_A_pilot_pro–ject_to_motivate_young_learners_towards_Problem–based_Learning_PBL_using_)

technological\_tools/links/56af716408ae7f87f56a9206/Making-the-Challenges-Possible-through-Education-Superhighway-A-pilot-project-to-motivate-young-learners-towards-Problem-based-Learning-PBL-using-technological-tools.pdf

- [17] Massive Open Online Courses (MOOC): MOOC for Life. (2021). Webopedia. <https://www.webopedia.com/definitions/massive-open-online-course/>
- [18] Ng, K.T., Baharum, B.N., Othman, M., Tahir, S., & Pang, Y.J.: Managing technology-enhanced innovation programs: Framework, exemplars and future directions. *Solid State Technology*. Vol. 63, No.1s (2020). Pp.555-565. (2020). <http://www.solidstatetech-nology.us/index.php/JSST/article/view/741>
- [19] Carr, A., Balasubramanian, K., Atieno, R., & Onyango, J.: Lifelong learning to empowerment: Beyond formal education. *International Journal of Lifelong Education*, 37(1), 1-16. (2018). <https://doi.org/10.1080/01587919.2017.1419819>
- [20] Ng, K.T. & Fong, S.F.: Linking students through project-based learning via ICT integration: Exemplary programme with best practices. (2004). [https://scholar-google.com/scholar?hl=en&as\\_sdt=0,5&cluster=5854776128456547304](https://scholar-google.com/scholar?hl=en&as_sdt=0,5&cluster=5854776128456547304)

