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Digital inequalities at high schools in Thailand: A survey-based exploration leading to expert-backed bridging strategies

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ABSTRACT

Purpose: The purpose of this research is to explore the accessibility of online education for high school students in Thailand. It especially focuses on identifying the inequalities among Thai students in terms of availability of IT hardware, internet access, and IT skills by comparing the results of surveys of students in urban areas with those from students in rural areas within Thailand. Based on these findings and input from experts in the Thai education system, strategies to reduce digital inequalities are presented.

Design/methodology/approach: To fulfill the objectives of this research, primary data is collected through online surveys with Thai high school students in order to explore digital inequalities. Additionally, semi-structured interviews with experts on Thai education are conducted in order to evaluate the findings from the students' survey responses and to generate bridging strategies. Moreover, a regional comparison based on findings from research conducted in neighboring countries will enable an analysis of the findings in an international context.

Findings: This research provides information and insights into digital inequalities existing in the Thai education system. It reveals insights into the availability of IT hardware and access to the internet for online education, as well as the IT skills of high school students across Thailand. It highlights the differences in these areas between urban and rural locations within the country. Based on these findings, expert-backed recommendations are provided to bridge these inequalities.

Originality/value: The demand for IT in education is increasing significantly. Recent developments, such as the COVID-19 pandemic, have accelerated such trends. These rapid evolutions need to be explored regularly in order to inform appropriate intervention strategies. Therefore, this research contributes to academia and enhances the ability of stakeholders and decision-makers in Thailand's education sector to respond effectively to the increasing digital inequalities experienced by Thai high school students.

Keywords: Digital Inequalities, Digital Divide, IT Hardware Accessibility, IT Skills, High School Students, Thailand.

INTRODUCTION

The importance of the usage of IT in education has increased significantly in the last few years. This importance reached its highest point so far during the COVID-19 pandemic in which the classical form of onsite teaching had to be adapted into online teaching without prior notice and in the shortest possible time. This led to issues not only in the Thai education system but also globally. (Imsa-ard, 2020; Satoshi, 2022) The Thai administration initiated intense programs more than ten years ago to improve access to IT for students. This program was stopped following the coup d'état in 2014. (Todd, 2015; Tubplee, 2019) Access to IT is of high importance in the knowledge economy. Limitations caused by differences within the society of a country, for example, lead to disadvantages and inequalities— a so-called 'digital divide.' (Giebel, 2013)

The Thai educational system is managed, organized, and overseen by the Ministry of Education (MOE). The ministry defines the national educational standards and aims to provide education for every age group of Thai people. To do so, it has divided students into three main groups (Phumphongkhochasorn et.al., 2021):

- Pre-school education (optional, starting from the age of three years)
- Primary school education (6-year program known as "Prathom", Thai classes P1 to P6)
- Secondary school education / high school education (6-year program known as "Mattayom", Thai classes M1 to M6)

Besides the MOE's aim to teach Thai students all relevant knowledge in the context of Thai culture, teaching technology and especially IT-related skills have been part of the curriculum for several years. Such activities have especially been clustered as part of a program called 'Thailand 4.0'. It divides the IT skills of people into three groups in order to develop their skills according to their capabilities and needs: (Phumphongkhochasorn et.al., 2021; Sombunsin andWannasri, 2022)

1. IT skills at a beginner level
2. IT skills at an intermediate level

3. IT skills at an advanced or expert level

To reach the aim of increasing the awareness, usage, and access to IT in Thai classrooms, the MOE allocated a budget and specific materials and schooling for students and teachers. Critics have raised concerns, as the success of such programs is difficult to evaluate and monitor. In particular, the very different systems, structures, cultures, and attitudes among diverse schools in the various Thai regions seem to be a challenge. (Boonmoh et.al., 2021; Sitthisomjin et.al. 2020).

The need for IT in education achieved new relevance at the beginning of 2020. When the COVID-19 virus began spreading worldwide and the pandemic situation was declared, the MOE needed to act quickly in order to limit the circulation of the virus among students and teachers. An initial decision was made to delay the beginning of the new school semester in April 2020. Soon it became obvious, however, that the pandemic would further worsen and that stopping all teaching activities could not be the only solution. The MOE developed a program using the slogan "Stop school but not stop learning **(โรงเรียนอาจหยุดได้แต่การเรียนรู้หยุดไม่ได้)".** The main intention of the program was to switch from onsite teaching to online learning. Already at this very early stage, critics announced worries about the efficacy of online education and the learning outcomes of students. (Satoshi, 2022)

Today, in September 2022, the number of COVID-19 infections is at a low level and the pandemic seems to be slowly coming to an end. Therefore, this research work explores these concerns by raising the following research questions: Do Thai high school students have the required hardware and the necessary IT skills to participate sufficiently in online learning? What kind of recommendations can be given to improve online learning for Thai high school students?

In the first section, this research work summarizes the relevant literature about the digital divide in Thailand. Therein it provides the framework of the research. It describes the two ways to generate primary data to better understand the phenomena: First, by performing an online survey with Thai high school students. And, second, by conducting expert interviews to evaluate and comment on the findings from the student survey. The findings are summarized and are used as a basis to answer the research questions. In the final section, recommendations and an outlook is provided.

LITERATURE REVIEW

The Southeast Asian country Thailand has a total population of 69.6 million people. Half of its population lives in urban areas, such as Bangkok and Nonthaburi City. The country has a literacy rate of 94%. 78% of the total population uses the internet. 95% of Thai students complete primary school. 15% of children younger than 14 years are employed. In 2021, the formal Thai school system including primary, secondary, and higher education had a total of 12.5 million students in public and private institutions. 4.3 million of these students are high school students. (National Statistical Office, 2022; O'Neill, 2021; World Bank, 2022)

IT usage in Thai high school education prior to COVID-19

The first attempts to implement national programs to increase the usage of IT in classrooms were initiated in the year 2012. The government of the former Thai prime minister, Ms. Yingluck Shinawatra, began a program called 'One-Tablet-Per-Child'. The aim was to raise access to IT devices (here: tablets) for students. This was done by providing around 800,000 tablets with learning materials for the main subjects to students all over the country. (Tubplee, 2019; Viriyapong and Harfield, 2013). The program had its share of supporters, but critics raised concerns that the very different IT skill levels of the various age groups and different regions were not accounted for. There were serious concerns that students were overburdened and that increased IT usage could be unhealthy for students. Budgets used for this program could have been used more efficiently at other points, critics highlighted. In 2014 the government changed due to a coup d'état. With this change in the administration, the 'One-Tablet-Per-Child' program was ended. (Tubplee, 2019; Todd, 2015).

New approaches were made again in 2016. The new Thai administration initiated a program called 'Thailand 4.0'. This nationwide program was aimed not only at students but at all kinds of sectors within the country. It developed and defined actions for the years from 2017 to 2021 and provided budgets for technology implementation and schooling. (Phumphongkhochasorn et.al., 2021; Wittayasin, 2017) The usage of technology at schools increased. Classical blackboards were often replaced by interactive devices. The use of computers and tablets for teaching also increased. (Puttimanoradeekul, 2021)

IT usage in education in Thai high school education during COVID-19

During April and May 2020, the Thai MOE prepared to adapt education during the COVID-19 pandemic. The digital readiness of the education system was analyzed and digital TV channels were certified to broadcast educational content. In the following months, online learning and educational TV channels started their work. (Satoshi, 2022) An exploration of the student's perception of this sudden 'forced change' from onsite to online learning came as the result, that students think online learning "did not encourage sufficient access to the education" and "did not think that their instructors could organize the lessons efficiently". (Imsa-ard, 2020) At the same time, this research stated that students, in general, are willing to perform online learning, even though technical problems occur, and disruptions and demotivation were common. A majority stated they preferred learning onsite (face-to-face classroom).

The COVID-19 pandemic hit the country and the Thai education system five years after the end of the 'One-Tablet-Per-Child' program. The MOE organized actions to switch from onsite teaching to online teaching. The need for IT devices and IT skills among students and teachers increased significantly. Budgets and extra schooling programs were implemented to react swiftly. Additionally, teaching via television was provided to support the individual online teaching of the schools. The increased demand for IT devices led to promotions from IT companies. Nevertheless, low-income households especially encountered issues with covering the new expenses. (Boonmoh et.al., 2022; Nantha et.al., 2022, Tuangrattanaphan, 2021) Seangsawang and Wongprasit (2021) analyzed guidelines for primary school administrators in one Thai region and came to the conclusion that "most parents do not have the technological tools for their children to study online because they do not have enough money". Nuankaew et al. (2021) explored the impact of COVID-19 on higher education in Thailand and found out that "the digital technology cannot catch up with the people, due to the expenses hindering the needs to find the proper learning tools and materials for students to perform effectively. In addition, the important problem is the internet network system that does not cover many rural areas."

Eliyana and Ardiyansah (2021) investigated online teaching in rural areas of Thailand and found that "[only] a portion of all grade school students in rural areas are outfitted with a device and decent internet connection", leading to disruptions in the learning process for many students.

Besides the availability of required IT equipment, IT skills, and internet, Somsathan and Sanjaiprom (2021) stress the fact that matching teaching material needs to be available and teachers need to be schooled to perform this form of teaching, as otherwise "teachers will be unable to deliver and design engaging and effective eLearning lessons." Espino-Díaz et al. (2020) analyzed the impact of COVID-19 on educational staff and highlighted the "emotional exhaustion, stress, anguish, or anxiety due to confinement and distance education" on the teacher's side, and added that "excessive bureaucratic tasks, unclear instructions, lack of support in teleworking, and lack of technical means were the main problems pointed out by teachers." Wongjamnong et al. (2021) explored the readiness for online teaching of Thai primary school teachers and concluded that they "are quite not ready with online instructional practices. (...) Teachers need to reskill or upskill in the field of educational technology."

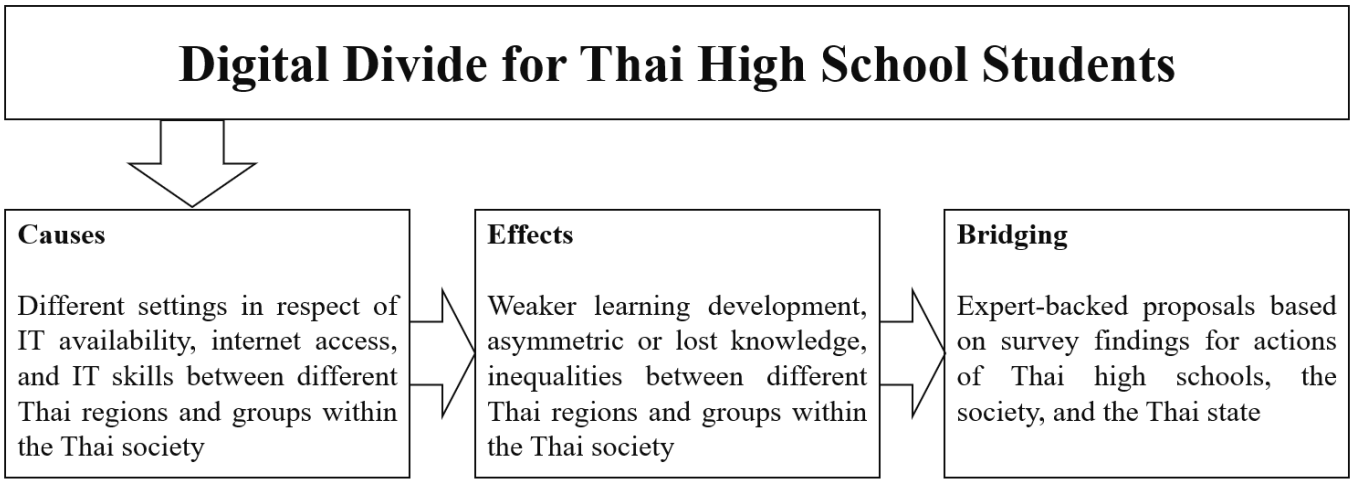
Giebel (2013) describes access to Information and Communication Technologies (ICT) as crucial in the knowledge economy. IT applications, such as social media, are useful for knowledge-sharing activities (Chen et al., 2014) and support the creation of facilitating learning environment (Ractham et al., 2012). Limitations to ICT lead to disadvantages referred to as the digital divide. Digital divides can be caused by major differences in the society of a country and insufficient access to ICT or to information in general. The results are weak economic growth and low development rates, an asymmetric localization, or even the loss of knowledge and low innovations. Ways to bridge digital divides can be achieved by national strategies or open-source solutions and open innovation management.

These digital divides resulting from differences in society and from unequal access to IT among Thai high school students are analyzed in this research work. The methods of this approach are described in the following section.

METHODS

Framework of research

Based on the model of the digital divide from Giebel (2013), this research explores different perspectives on the digital divide among high school students in Thailand. It analyzes the causes resulting from different settings within the various Thai regions and within different groups in Thai society. Here especially the access to the needed IT equipment, the availability of sufficient internet connections, and the level of IT skills are explored. The findings are analyzed and the effects are described. Based hereupon, expert-backed bridging strategies are discussed. Finally, recommendations are given.



Source: own figure, partly derived from Giebel, 2013).

Figure 1: Causes, effects, and bridging of the digital divide of Thai high school students.

Primary data from surveys with Thai high school students

To explore the inequalities experienced by Thai high-school students, an approach using case studies has been identified as an ideal method to gain data in order to answer the research questions. Yin (2009) describes case studies as a method "that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident." These described framework conditions are given in this research: A sudden increasing importance of IT in education being the contemporary phenomenon, with a focus on high-school education in urban and rural Thailand being the deepened real-life context, and the research question exploring the boundaries of this phenomenon within this context.

To receive information about the latest status of the phenomena, this research generated primary data from Thai high school students. The peer group has been defined as follows:

- High school students (Thai grades M1 to M6)
- In Thailand
- Studying at private and governmental schools
- Age 11 to 19 years

The research questions have been broken down into 19 separate questions, some with sub-questions. Using these questions and some additional, voluntary statistical questions for later evaluation, an online questionnaire has been set up and shared via social media and teacher networks with high school students. Between April and July 2022 students were able to respond to the survey.

In total, 368 surveys have been filled, from which 219 (= 60%) came from Thai urban areas and 92 (= 25%) from Thai rural areas. 57 students (= 15%) opted to not define their location.

Table 1: Received surveys from Thai high school students broken down by location.

	Quantity	**%**
High school students from		
Urban Areas	219	60%
Rural Areas	92	25%
Unclear Areas (undefined)	57	15%
Sum	**368**	**100%**

Source: This study.

Primary data from expert interviews on high school education in Thailand

In order to evaluate the findings from the surveys with students, expert interviews have been performed. These interviews on the one hand help to evaluate and interpret the survey data. On the other hand, they provide a different perspective of the online learning process, as several teachers involved in online teaching were able to share their expert opinions, experiences, and knowledge.

The experts have been selected based on their ability to provide a wide range of expert knowledge: Younger teachers and teachers who just entered retirement after COVID. Government teachers, as well as private teachers, have been interviewed. Teachers from urban areas were as well part of the interview series, as were teachers from rural areas. Additionally, one professor for Learning Sciences and Education has been interviewed, in order to receive an academic perspective on these findings and to receive information about teachers' experience in the learning process during COVID-19 ('Student teachers').

The interviews were conducted online. The teacher could choose a preferred language (Thai, English, or German). One week prior to each interview, the interviewee received the key data from the survey and a list of questions. The interviews were performed by one or two researchers and have been recorded for documentation and later evaluation. An anonymous list of interview partners can be found below.

Table 2: Anonymous list of expert interviews including their location, gender, interview language, and main contribution.

Nr. Expert Interview (EI-xx)	**Professional Background of Expert:**	**Region**	**Gender**	**Interview language**	**Providing Expert knowledge, especially in the fields of:**
EI-01	Government school teacher for German and English (retired after COVID)	Bangkok	F	GER	● Online teaching experience during COVID at a government school ● Experience as an older teacher dealing with IT
EI-02	Government school teacher for science	Rural Southern Thailand	F	TH	● Online teaching in a rural area
EI-03	Government school teacher for science	Suburb of Bangkok	M	TH	● Online teaching experience during COVID at a government school
EI-04	Government school teacher for German	Bangkok	F	GER	● Online teaching experience during COVID at a government school
EI-05	Professor for Technology and Information for Learning Sciences and Education	Bangkok	F	ENG	● Academic perspective of online teaching ● Experience with teachers in the learning process during COVID
EI-06	Private teacher and owner of language school for German language in Thailand	Bangkok	F	GER	● Only teaching experience during COVID as a private teacher/tutor
EI-07	Government school teacher for Mathematics	Bangkok	F	TH	● Online teaching experience during COVID at a government school

Source: This study.

RESULTS

Using data from the student survey and the evaluations of experts, the following results can be summarized. The results are backed by quotes from expert interviews and by statements made in the commenting sections of the student surveys.

IT availability for Thai high school students

Nearly two-thirds (62%) of Thai high school students had access to desktop computers or notebooks (including laptops). The remaining students had sometimes (21%) or no access (15%) to these IT devices. These results differ when analyzing the results from the different regions within the country: In urban areas, even 76% had access to computers but only 39% in rural areas. A significant difference. The access to printers (44%) and scanners (36%) is much lower.

> *"The school and students are not ready for an online class because lots of students cannot afford the needed IT devices."*
> *(Government school teacher, Interview # EI-07)*

Access to smartphones (including tablets) is more common. 90% of students in urban areas and 66% in rural areas had access to such IT devices. (Average for the complete country: 82%). Only a small group (8%) had no access at all. One expert stresses the fact, that sometimes a smartphone is available but it needs to be shared between the complete family or between siblings. Here situations occur, in which students cannot join online teaching, as the device is 'occupied' by a different family member.

> *"Often families had only one device. The parents and the students needed to share it."*
> *(Professor at the Faculty of Learning Sciences and Education, Interview # EI-05)*

When consulting experts, they confirm that nearly all students had access to smartphones. Nevertheless, they stress the fact that they are inferior to online learning: The screens do not offer the same quality to deal with information as a computer and the possibility to work on assignments is limited. At the same time, they are offering advantages compared to computers: A lower price, better mobility, easier to use and most often lower costs.

> *"Computers are much better for online learning. The screen on smartphones is just too small. Computers are offering a big screen and it is just superior and offers more interesting opportunities. Smartphones are more practical to use for students. They can use them everywhere. They do not need much space. And in any case, they had them already and did not need to buy them extra for online learning."*
> *(Government school teacher, Interview # EI-01)*

Nearly half (46%) of Thai high school students needed to invest in new IT equipment, such as computers or smartphones, during the pandemic. More investments were made in urban areas (47%) than in rural areas (40%). Only one quarter (25%) received financial support, for example from the government or school, for such investments.

> *"Online learning is more expensive than usual. This stresses me."*
> *(High school student, 18 years old, M6, no region defined, survey answer # 7)*

One expert raises health concerns in connection with the long-term usage of smartphones, as the blue light of the screens may harm the eyes of students if used for more than one hour.

> *"The blue light emitted by smartphones is not good for the eyes of the students. They should not be used longer than an hour otherwise it could harm the health." (EI-05)*
> *(Professor at the Faculty of Learning Sciences and Education, Interview # EI-05)*

A vast majority (83%) of students reported good internet quality in their homes. The urban area (88%) had slightly more positive answers than the rural areas (77%). Only a very small group of students (3%) had no access at all to the internet. Asking about the internet quality in schools, the results are not as positive: Only 40% report good quality. More than half (52%) of the students described the internet quality in their schools as being weak. In an open question, students had the chance to mention places which they go to in order to use the internet if there is no internet available at school or at home. The place most often mentioned, were the house of friends or other family members, cafes, malls, and restaurants. Moreover, students often stated that they change to mobile internet on their phones, such as 3G or 4G.

> *"The worst thing during COVID-19 was online learning because sometimes the internet was not good and we could not go to school."*
> *(High school student, 17 years old, M4, refused to define the region, survey answer # 12)*

Experts confirm that the internet quality in most cases was sufficient and major interruptions only rarely occurred. This especially can be stated for urban areas. Nevertheless, some teachers from rural areas reported weak internet connections. A nationwide issue seems to be the internet signal or WiFi network within school buildings. Some teachers commented on regular temporary electricity cut-offs, especially in the rainy period, interrupting online learning.

> *"We very occasionally had problems with the internet quality. In these cases, we need to wait. But it did not happen often."*
> *(Government school teacher, Interview # EI-01)*
> *"The internet quality is a problem for both teacher and student. It is not stable because my school is located in a very rural area next to the forest. It is less participation in class if compared with onsite."*

(Government school teacher, Interview # EI-02)

Online learning efficacy of Thai high school students

Half (50%) of Thai high school students are of the opinion that they did not learn better before the COVID-19 pandemic. There is no major difference in this opinion between urban areas (50%) and rural areas (54%). When asked about their participation in class, only 36% of the students think they were participating more when being in onsite classes. The majority (55%) was not of this opinion.

"The worst thing during COVID for me? I did not understand the teaching!"
(High school student, 15 years old, M3, Nakhon Si Thammarat Region, survey answer # 26)

Experts highlight that the participation of students during class decreased. Good students who used to participate in onsite classes also did so in online classes. Weaker students partly used the chance of online teaching to hide by turning off the camera and microphone and were not anymore reachable for the teachers. Especially, the usage of the camera has been stressed by nearly all experts. There seems to be a difference between classes in which the students knew each other personally before starting online classes. These students felt more comfortable to interact online, participated more, and were not as shy. A finding from many interviews is that teachers after COVID-19, they see advantages from a mix of onsite and online teaching. Such a hybrid model is partly seen as even more efficient than only onsite teaching.

"The participation of students in online teaching is lower compared to onsite teaching. Some good students were participating well. There was no change within this group."
(Government school teacher, Interview # EI-01)
"The interaction with students in online classes was difficult. There is no participation in class. The teacher cannot force students to turn on the camera. Some of them always turned off the camera. The teacher won't know what they are doing while joining a class."
(Government school teacher, Interview # EI-07)

66% of the students confirmed that their teachers could be contacted individually during the pandemic. 42% stated that their teachers were even available for individual (1 to 1) meetings if they had questions.

DISCUSSION

Based on the findings described in the previous section, the previously defined research questions can be answered sufficiently in the following way:

Table 3: Answers to research questions based on findings.

Research Question	Conclusion
Do Thai high school students have the required hardware and the needed IT skills to perform online learning sufficiently?	• Thai high school students did in many cases not have the required hardware to perform online learning sufficiently. One-third of this group had no access to a computer or notebook. Even though the numbers for smartphone access were higher, experts confirm that online learning only using smartphones is inferior. In rural areas this is much more severe than in urban areas: Less than half of the students had access to a computer. A clear inequality in online education opportunities between urban and rural areas. • The IT skills for online learning seem sufficient. Both students, as well as teachers, confirm this. Nevertheless, the broad unavailability of computers leads to lower skill levels for these IT devices.

Source: This study.

Taking these answers into account, the following section provides recommendations and an outlook.

Recommendations and Outlook

Following the findings the authors would like to provide two main recommendations, which are in line with feedback received from experts:

Recommendation 1: Implement actions to access computers:

To assure efficient online learning, computers are needed. As of today, a big group of students especially in rural areas has no access to computers. Government-supported projects should ensure that every student has access to a computer. Schools should explore opportunities to implement 'sharing communities' in which unused or slightly outdated IT equipment can be provided to students without access to IT devices.

"There should be programs making it possible for students and parents to get more affordable access to mobile devices with larger screens, e.g. tablets."

(Professor at the Faculty of Learning Sciences and Education, Interview # EI-05)

Recommendation 2: Adapt and provide teaching material

Reaching the students and motivating them to learn and to participate in the same way as they would do in onsite teaching requires an adaptation of the teaching material. Specific material for online teaching should be developed, promoted, and introduced to teachers.

> *"Online teaching should be made more interesting and more attractive for students. Teaching material including media should be provided, which is better adapted to online teaching. More pictures, audio, and videos. More activities are needed."*
> *(Government school teacher, Interview # EI-01)*

The COVID-19 pandemic has not yet ended (Buot and Fama, 2022). Future pandemics are possible. In any case, the access for students to IT equipment and the improvement of IT skills are of high importance for their future. The existing IT inequalities in education for Thai high school students should be explored and monitored further to better understand the phenomena, localize trends, and develop solutions.

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