THE HUMAN ASPECT OF ICT IMPLEMENTATION IN THE JAPANESE EDUCATION SYSTEM: A CASE STUDY OF PRE-PANDEMIC SECONDARY EDUCATION IN KANAGAWA PREFECTURE

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Abstract:

This article is based on a case study done at one public secondary school in Yokohama, Japan with supplementing data from surrounding schools. The aim of the research is to bring attention to student and teacher lifestyles concerning information communication technology (ICT) prior to the pandemic (before it became an enforced necessity) in personal and school-related settings and discuss possible implications for ICT policies at secondary schools in Japan. After a yearlong observation period, a questionnaire was conducted to find specific patterns that could impact ICT policies for the school. Additionally, teachers and parents were interviewed for details and information to highlight potential reasons behind the survey results along with additional findings. Interviews from surrounding schools were conducted to further supplement the case study. The analysis focused on finding patterns that highlight positive and negative elements of ICT perceived by the students, teachers, and parents at the school. Discovered patterns were further discussed to find implications for policy development and areas for future research. Critical findings included the deterring factors for teachers to use ICT being nearly identical to the desired factors for parents, thus creating a conflict of interest when it comes to ICT use cases for school-related purposes. Additional findings include the parents' roles in assisting ICT-related productivity work in conjunction with modern-day smartphone consumerism, which leads to a lack of productivity mindset for the students. It was identified that without measures in place to address teachers, it is difficult to expand the usage of ICT for teachers with just a general policy and device availability. This implies that post-pandemic ICT plans could still produce resistance and issues from users despite their proliferation and that any progress in ICT for education can enter stagnation unless the issues found in this study are addressed.

Keywords: Japan, educational technology, ICT, education policy, technology perception

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1. Introduction

Japan has been a forerunner in the technology race in the private sector for many years. One of the most prominent of the latest changes in technology is the recognition of the usefulness of Information Communication Technology (ICT) to various effects, including cost saving, productivity enhancement, and the improvement of working conditions for those utilizing the technology (Aristovnik 1). One major area of research on the topic of ICT is the impact it has on the education sector. Interest in ICT in education has been increasing since the turn of the twenty-first century (Kozma 119). ICT has been recognized to hold the potential to promote various positive changes to modern education, including a more student-centered learning environment (Smeets 135). By having a student-centric educational experience, students have increased opportunities to become more expressive, creative and communicative than when learning in a traditional, teacher-centric, classroom setting (Ferrari *et al.* 354). These skills have been highlighted significantly during the emergence of the knowledge economy and have since been discussed in a variety of ways, including the topic of how the integration of ICT has an impact on the economy (Brinkley 5). In Japan, the COVID-19 pandemic has created a landscape where even the most resistant towards ICT in education was forced to address the issue (Yamamoto). Thus, a suburban public school can create an interesting case study for the implementation of ICT in areas that have traditionally shown resistance.

While many studies highlighted the potential of ICT in the classroom setting for a more engaging and student-centric learning environment, especially after the remote classroom increase during the pandemic since 2020 (Obe, Okusu), an equal amount of attention is still needed on how ICT related policies can be implemented from an organizational standpoint. To successfully do so, the human aspects of ICT resistance must be addressed in order to avoid stagnation in ICT development and adoption. As more classes return to the classroom in Japan (Hall), the need to address ICT in education is ever more so important to maintain the synergy of advancement and not return to pre-pandemic states of technology utilization at schools. This article suggests that the key factor for successfully implementing ICT into an education system is not just a technological one but a human-centric one. Plans for education reform will only be as effective as their reception by the actual users. Thus, for Japanese education to benefit from the aforementioned potential of ICT, and for any advancements from the initial pandemic-era to continue, studies centered around the perception of users in the Japanese education system are necessary. This study identifies and illustrates challenges in the organizational aspects of bringing ICT into the classrooms and school systems by closing in on a detailed case study, focusing on the perceptions of ICT by the teachers, students, and parents at one public secondary school in Yokohama before the pandemic forced such users to adapt to using ICT. Pre-pandemic data can highlight key elements of user perception without the forced usage of the initial pandemic years. Thus, fundamental areas of importance concerning the human aspects of ICT can be found.

2. Literature Review

Japan has an economy that is greatly tied to consumer electronics and digital content while being home to the fifth-largest Internet population in the world (Holroyd 41) prior to the pandemic. However, it cannot be said that consumer ICT usage was a product of the education system. This is because previous initiatives for bringing ICT into the education system did not bring about significant changes to a school system that had remained mostly unchanged throughout the 20th century (Woo 68). As demands for advancement using ICT grow in the economy and society, not only as consumers but also as contributors to the digital world, the Japanese government concluded that there is a need for an education system that prepares future citizens to adapt to such changes (MEXT 2).

Like many governments around the world, the Japanese government has expressed that the education system of the future must provide students with the tools to think critically and creatively in the context of ICT (Bjork *et al.* 621). Through reforms in education, graduates may further advance an economy and society that has already begun embracing ICT into its operations (Oshima *et al.* 3). However, initial efforts to bring ICT into the school system have yet to see success in achieving the originally intended goals. The Information Technology in Education Project (ITEP), which began in 1999, set goals to have online portals, materials, training programs, and facilities to promote high-speed networks and utilize digital devices at schools by 2005. When the first results proved to be short of its initial aim, the Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society (IT Strategic Headquarters) was founded in 2001 to establish facilities and environments such as providing enough computers and high-speed Internet connections at schools by 2005 (Vallance 279).

When several additional attempts proved to be short of expectations, the Ministry of Education, Culture, Sports, Science, and Technology, also known as MEXT, published a new strategy in 2011. The specific goals of this new strategy are to enhance the quality of education, provide information education using ICT effectively in classes, and reduce the burden of administrative work by the teachers. In particular, developing information literacy, understanding the moral aspects of using ICT, and having student-centered productivity such as presentations were highlighted (MEXT, 6-7). The same year, a new collaborative effort to bring ICT into classrooms began through the joint efforts of MEXT and the Ministry of Internal Affairs and Communications, also known as MIC (Oshima *et al.* 4).

However, questions arise as to whether schools have actually had significant changes concerning technology. Teacher resistance to government policy in Japan has been ongoing as the history of modern education showcases a long-standing rivalry between teachers and policymakers. On many past occasions, liberal teachers resisted a conservative government (Aspinall, 2001). However, this may not be applicable to the ICT policies of today since it is the policy that aims to bring about change, and the

teachers are the ones who resist conservatively. This leads to a need to closely examine the situation at school-level. Therefore, this study will examine the case of one public secondary school in Yokohama, Kanagawa Prefecture, to find the perception of the intended end-users of ICT policies; being the teachers, students, and staff. This focuses the attention less on the technicalities of ICT and more on the human aspects of willingness or resistance to such technologies in the school.

3. Research Questions, Significance, Material and Methods

3.1. Research Questions
The following questions will be discussed in this study to examine a case of end-user perception and situations concerning ICT utilization at school.
1) What factors can contribute to a successful implementation of ICT?
2) What factors contribute to resistance towards implementing ICT?

By answering these questions, this research will discuss the current status of information literacy, morals, and student productivity as proposed by MEXT in the context of a suburban public school in Kanagawa prefecture.

Successfully implementing ICT requires changes to many areas in a strongly established education system in Japan. According to Lewin's change theory, change can be achieved when adjustments are made in the resisting force, as there is already a driving force for change at play. However, the resisting forces can be difficult to identify at times because many of them are embedded in the cultural norms of the present (Schein 28). In an educational setting in Japan, these cultural norms can be how teachers prepare for lessons, homeroom classroom management, school festivals, and club activities.

Nevertheless, as Lewin's theory presents a resisting force, it also notes that there is a driving force for change. In the context of the Japanese education system, this can be the need to budget time and resources better or the need to adjust to changes that are already happening in society and the economy. Through these research questions, this study aims to find specific elements that serve as driving and resisting forces for bringing ICT into the case study school system.

3.2. Significance
In most studies for ICT in education, the planning aspect of ICT or the effectiveness of certain ICT services for particular subjects has been emphasized. Kozma (2008) published many comparative studies that focused on leading countries for implementing ICT plans for education during the first decade of the 21st century. This study provided insight into what attitudes, elements, and priorities could be required to bring about results concerning ICT at schools. However, the general comparisons stayed at the governmental level. Likewise, Vallance (2008) compared ICT policies for education between Japan and Singapore with the implication that Japan can benefit by learning from the Singaporean experience. Nevertheless, like Kozma, Vallance's study also focuses on the macro-governmental level of planning with little mention of the actual school environments. If

only such studies are considered, successful implementation of government-level plans relies on the assumption that individual schools, teachers, students, and parents are supportive of such plans. As this study will later suggest, this may not always be the case in Japan. Thus, this study is significant because it can complement previous studies, such as that of Kozma and Vallance, and provide much-needed data and feedback from the teachers, students, and parents at the school level. Additionally, according to MEXT, information literacy is not only the ability to consume information but also to be able to independently express themselves based on the collected knowledge (MEXT, 4). Therefore, the student's ability to independently utilize the data collected through ICT will become an important indicator of the effectiveness of ICT policies at schools. This study will provide a window into student trends that can help analyze whether such abilities are being cultivated at schools.

While technology can be proven to be helpful in classroom settings, technology in itself cannot transform cultural traditions in countries like Japan, where an established cultural norm can prove to be very resilient (Holroyd 62). Cultural norms at public schools can include the continuation of current teaching methods due to the inconvenience and lack of time for developing new lesson plans, the avoidance of changes that do not comply with the already established routines of operation, and the focus on previously established high school and college entrance examinations. In conjunction with the positive aspects of ICT, there is a need to understand the users of such technology, namely the students and teachers, and partially the parents, for implementation to be successful at school-level. Introducing ICT into the education system can have many layers of usage scenarios. On a macro-level, ICT can facilitate and speed up work needed in the board of education or ministry.

However, an education system includes, not just governmental policies and educational boards, but also the social culture and personal habits of teachers, parents, and students as well. The perception of ICT can play a role in how effectively it is accepted into the activities established at school-level. One vital step in understanding the perception towards ICT by the users is to analyze their current ICT lifestyles. To find potential reasons behind the acceptance and resistance to ICT in Japanese schools, this paper illustrates the end-user situation of ICT in a suburban school in Japan through an in-depth case study consisting of student questionnaires and interviews, teacher interviews, and Parent Teacher Association (PTA) interviews. By considering the critical points discussed in this study, the degree of impact that the new vision from MEXT has at school-level can be observed, particularly in the goals for information literacy, administration, and the proper understanding of morals. Through such observations, elements that facilitate or hinder ICT at schools can be found. In doing so, policymakers can make the best of the time and resources for ICT in schools with greater efficiency, thus bringing technology standards for public education on par with the rest of the technologically advanced society of Japan.

3.3. Material and Methods

A case study, using a combination of quantitative and qualitative methods, was conducted at one public secondary school located in Midori-ward, Yokohama, to find specific details on the perception of ICT entering the school system as well as the current state of ICT usage among schools teachers and students. This school was chosen because of its suburban location and resident characteristics. The definition of suburb used for this study is a mainly residential district outlining a major city. According to the Ward Office Census, Midori-ward in Yokohama is mainly a residential area with people going to Tokyo and other parts of urban Yokohama to work. Midori-ward residents have a balanced ratio of people working in a variety of sectors, with manufacturing, wholesale, telecommunication, services and government employees being the majority at a combined 71% of jobs by residents (City of Yokohama). Therefore, it is implied that the majority of residents have the purchasing power to support the regular consumption of ICT products and services if they desire. As a small-scale representation of the various sectors of industry as well as residential proximity to the capital city, Tokyo, Midori-ward proved to be an adequate choice for the location of this case study.

A combination of qualitative and qualitative methods was used in consideration of the number of participants, the physical limitations of the researcher, and the type of data being collected (Creswell, 32).

The quantitative part of the study was aimed at finding the general state of the student body. A survey was used to self-rank specific areas of ICT usage in school and personal settings. Due to the size of the student body and the limited time given by the school, identifying a generalized description of what is trending (Creswell, 202) among the students was the most realistic approach.

A similar survey was conducted with the teaching staff. Following the survey, teachers who willingly volunteered were interviewed. Since observation of all classes was not realistic due to school policies and the limitations of time and manpower, the interview served as a method to hear the reasoning behind (Creswell, 240) the perception and usage of ICT by the teachers. Additional interviews from other schools in the neighboring area were used to supplement the findings of the case study if necessary. The list of participants from each school can be found in Table 1.

Finally, some members of the PTA volunteered to share their experiences and thoughts on the matter, so a more casual conversational interview was conducted with willing parents. The goal of the interview was to supplement the student and teacher survey findings if necessary.

Table 1: Interview and survey participants

	School Status	Data Collected	Date Collected (Day MONTH Year)
Case Study	Regular Public Secondary School	477 students (Survey) 1 Principal Teacher (Interview) 17 Teachers (Interview) 9 PTA members (Interview) Class observations Follow-up Interviews	FEB-MAR 2016 26 APR 2016 25 APR - 1 MAY 2016 NOV 2015 - MAR 2016 FEB 2015 - MAR 2016 22 & 26 JAN 2018
Supplementary Data	Experimental (Pilot) Public Secondary School	1 Teacher (ICT head, Interview) Class observations	12 OCT 2012 OCT-DEC 2012
	Regular Public Secondary School in the vicinity	1 Principal Teacher (Interview) 1 Teacher (ICT head, Interview)	15 OCT 2012
	Regular Public Secondary School in the vicinity	1 Teacher (Interview)	3 DEC 2016
	Regular Public Secondary School in the vicinity	1 Teacher (Interview)	22 JAN 2018
	Regular Public Secondary School in the vicinity	1 Teacher (Interview)	21 JAN 2018
	Private Secondary School in the vicinity	1 Teacher (Interviews)	MAY 2018

3.3.1. Student Survey Details

A student survey was conducted at one public secondary school in Yokohama following an observation period from February of 2015 to March of 2016. Prior permission was granted by the board of education and school authorities under the condition that study results are used for academic purposes and that the participants remain anonymous in the final publication. All participants were briefed on the nature of the study beforehand, and all participation was completely voluntary and anonymous. While the initial draft included names of the schools in the vicinity as well as the case study school name, it has been decided that such information can be used to deduce the participants (including particular teachers who are critical of the current system) and create risks in their careers. Therefore, all school names have been removed in the final publication of this study.

The student body of the case study school was approximately 560 students at the time of the research being conducted. A total of 477 students participated in the survey which equates to over 80 percent of the student body being represented in the collected data. The male and female ratio in the student body was almost the same at the school, with year 2 and 3 having approximately 200 students each, and year 1 being slightly smaller at approximately 160. Based on the number of survey results by boys and girls

and the number collected from each year group, bias based on gender and grade can be minimized from the data as well. Based on the total ratio of participants, the survey results can be considered to represent the student body with a confidence level of 95 percent and an approximate 2 percent margin of error. The details of student participants can be found in Table 2.

Table 2: Participant details for case study student survey

Total Students 477 (Total students approx. 560)								
Boys 228			Girls 197			Unknown 52		
1st Years 143 (Total students approx. 200)			2nd Years 174 (Total students approx. 200)			3rd Years 160 (Total students approx. 160)		
Boys 70	Girls 73	Not Specified 0	Boys 85	Girls 67	Not Specified 22	Boys 73	Girls 57	Not Specified 30

The data was collected during February and March of 2016. Students participated regardless of prior ICT knowledge or device ownership. The questions included various ICT activities, including entertainment consumption, content creation, and communication. The questions were under a numeric ranking system based on the frequency of how much of each ICT activity the students engaged in. All questions were divided into personal and school-related usage sections to see different trends concerning their ICT lifestyle in both settings. Students were also given the opportunity to add any additional information in writing if necessary.

The collected data was archived, and the relative frequency statistics were simplified for analysis and discussion. The original survey was conducted in Japanese and translated into English during the analysis process. Blank answer sheets were not included in the participant count. Partially answered sheets were included up to the point of where information was given. Answers that were unclear were not included in the analyzed data. Additionally, any answers that did not correspond with the question being asked were discarded.

3.3.2. Teacher Interview Details

Students are only part of the picture in a school system as teachers are just as necessary for a school to function. Therefore, a structured interview was conducted with the principal of the school and seventeen teachers in addition to the student data. Prior to the interview, teachers filled out a survey about their ICT usage at school and in personal settings. Because the survey does not show the reasons behind their answers, an additional interview was conducted with willing teachers. All teacher interviews were conducted in groups of 2 participants to save the limited time allowed by the teachers and to keep the conversations open and casual enough to speak freely. This also functioned as a way to clarify misunderstandings by having a third person confirm what is being said. Teachers were allowed to choose who to participate with, and all participation was voluntary.

A predetermined outline of questions was printed. This outline focused on asking the reasons behind their initial answers to the survey and how ICT is being perceived by the teacher. Teachers were allowed to ask each other as well, and any free talking about certain matters of interest was permitted. At times, additional follow-up questions were asked for clarification or for examples of ICT usage.

However, the interviewer made it clear not to share any prior-knowledge of government policies with the participants, even when asked, in order to prevent last-minute changes in the teacher's attitude or perception of ICT. The reasoning was that additional knowledge that was unclear to the teacher prior to the interview may become a factor in a teacher's negative experiences becoming revised to be positive during the process of the interview. The goal was strictly to find the teacher's reasoning behind his or her answers in the present, not to generate support or disagreement concerning future government policies.

The interview was divided into three parts: Personal, Classroom, and Administration. Questions were predetermined, and teachers were free to answer in any way they desired. Teachers were also free to skip any questions that they could not answer and were given the opportunity to add additional information if necessary. Teacher interviews were conducted verbally in Japanese. Answers were directly translated into an English summary as the interview proceeded. While the interviewer is bilingual in Japanese and English, all translated summaries for each answer were checked and clarified with the interview participant to avoid mistranslation or misinterpretations of the teacher's intention.

3.3.3. PTA Interview Details

PTA interviews were conducted over a longer period of time due to scheduling and participation reasons. Nine members of the PTA agreed to an interview. Face-to-face interviews were conducted in November 2015. Telephone and online interviews were later conducted on a case-by-case basis throughout the year with a less formalized format. Interviews had predetermined questions to save time and aid in identifying patterns between different parents. However, parents were allowed to speak freely about their experiences and thoughts about ICT and the education of their children. The interviews were conducted verbally in Japanese. Answers were translated into English in the same way as the teacher interviews. Also, like the teacher interviews, clarification and confirmation were made with the translated results to avoid misrepresenting the parents.

4. Results and Discussion

4.1 Results and Findings from Student Surveys

Students had a very low perception of ICT as a learning tool and a very high perception as a means of communication and entertainment outside of school boundaries. Digital devices were used for personal communication on a daily basis by the majority of the students, while school-related daily communication was significantly lower. Seventy-five

percent of the students used messaging services at least on a weekly basis and 57% used it daily for personal use. Sixteen percent of students used messaging services to accomplish school-related tasks on a frequent basis, such as sharing school information, homework, club-related discussions and committee-related discussions. However, the majority of respondents, at 41%, never used it at all for school-work. Detailed results can be found in Figure 1.
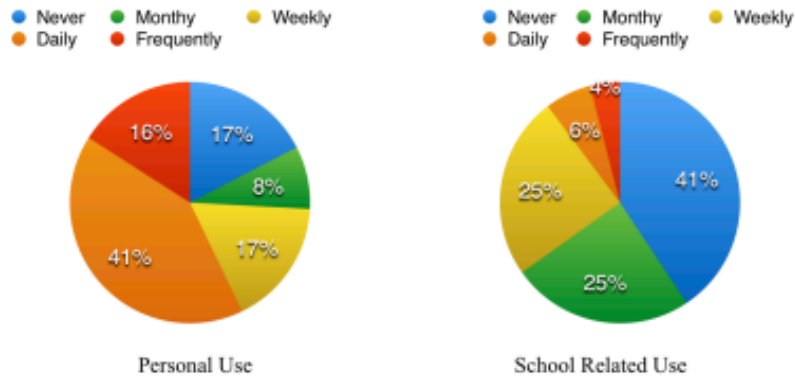

Figure 1: Text and messaging service usage by students

Games, music, and video were chosen to represent entertainment consumption. Due to smartphones being prohibited from school, only personal usage was considered for entertainment consumption. Results were high among the students, with the amount of consumption being evenly balanced across a broad spectrum of usage frequencies. Details can be found in Figure 2.
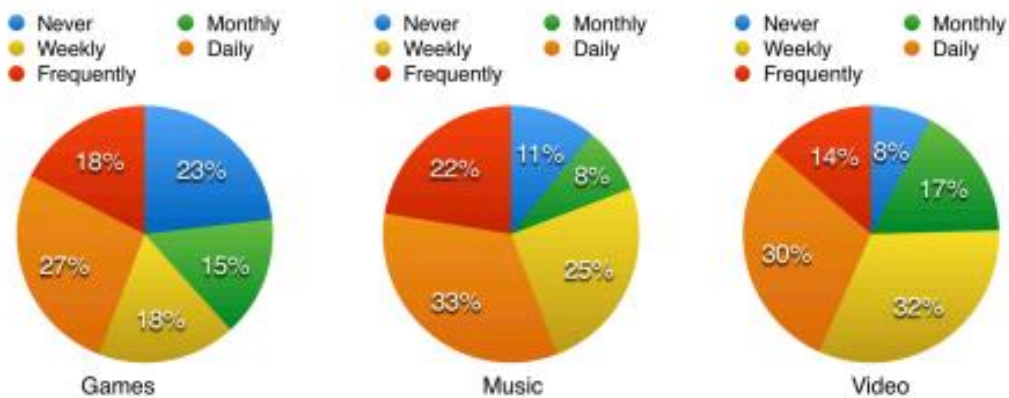
Figure 2: Entertainment consumption by students

Word processing, data management, and presentations were chosen to represent productivity. While this was puzzling, considering that students were supposed to have learned basic word processing skills at school, judging from the answers given, the students seemed to feel that whatever skills were taught in the computer laboratory did not translate into actual usage. Students had little knowledge of ICT usage for productivity or creativity as their primary window into digital services was through

smartphone applications, not computers. Most smartphone applications were related to digital chat, social networking services, and entertainment. For productivity, there was little difference in the number of answers between personal and school-related usage, both being very low in usage. Therefore, both numbers were compiled into a larger data pool to calculate the percentages. Productivity showed all categories, with over 70% of students never using ICT for productivity purposes. A particular area of interest is that, during the observation period, students were given English presentation assignments and were encouraged to use the Internet for research and print any supplementary materials for extra credit. Despite the incentive, 83% of the students responded that they had never used ICT for presentations. An explanation for this could be possibly found in the parent interviews later discussed. Figure 3 shows the number of students per answer for productivity between personal and school-related usage. Details for productivity can be seen in Figure 4.

Figure 3: Differences in personal and school-related productivity usage by students

Figure 4: Productivity usage breakdown for students

4.2. Results and Findings from Teacher and PTA interviews

The teachers at the case study school had little expectations and incentive to utilize ICT in the teaching and managing of the students. This was primarily due to ICT being viewed as a liability by many teachers concerning the security of personal information. Teachers stated that unclear responsibilities when students engage in social network services and other online activities concerning school-related subjects made it risky for

the school to promote such services vocally. Many teachers felt that they may become responsible for negative outcomes that remain out of their control.

While teachers acknowledged that ICT skills are necessary for the future success of their students, they believed ICT may become more of a hindrance than a benefit to their classroom management and teaching activities. A frequent example of such hindrance was the potential of misuse of technology during class or between classmates. However, when it came to their personal usage of ICT outside of school boundaries, teachers embraced many services and conveniences that came from using smartphones for communication with friends and family, online banking and shopping, as well as browsing the Internet for news and information. The major findings from the teacher interview have been organized into perceived benefits and drawbacks in Table 3.

Table 3: Perceived benefits and drawbacks of ICT in education from the teacher interviews (bolded portions are highlighted in 4.3 Discussions)

Benefits	Drawbacks
Classroom data management	**Personal life invaded by work (Parent Meetings)**
Ubiquitous work environment	**Addition of new work categories to current load**
Internet (Ease of finding information)	**Degrading of traditional basic skills (Writing)**

Parents had concerns over ICT usage due to network security and privacy concerns. Parents were more focused on grades and manners and were willing to take over many ICT-related tasks during homework or student projects. For example, during the observation period, many students had printed material for their English presentations.

However, when preparing materials for their speeches, the students would brainstorm while the parents did the Internet search and word processing. Learning ICT utilization was not a priority for the parents as their focus was more on high school entrance examinations, which did not utilize and required ICT skills at the time. This explains why, as seen in section 4.1 above, some students stated in their responses that they have never used ICT for the presentation assignments despite having printed material at hand on presentation day.

Parents saw ICT skills as important for being competent in future society but did not see it as a priority for junior high school students, believing that such practical skills would be acquired naturally outside of school. Findings from the PTA interview suggest that many parents provided assistance with computer-related tasks so that they could finish the assignment as quickly as possible. Therefore, instead of bringing ICT more into academic life, parents actually preferred their children to be less exposed to ICT with concerns of over-reliance on technology and an already unbalanced digital life at home with smartphones. The parents' perceived benefits and drawbacks of ICT in education are organized in Table 4.

Table 4: Perceived benefits and drawbacks of ICT in education from
the PTA interviews (bolded portions are highlighted in 4.3 Discussions)

Benefits	Drawbacks
Better news and information service	Costs for education
Ubiquitous student progress access	Privacy and personal information
Easier to communicate with the school	**Students rely too much on technology**

One critical finding was that many of the benefits and drawbacks of ICT perceived by teachers and parents were in direct opposition to each other. The general theme of this discord was that while parents saw communication with teachers using ICT services as a convenience, teachers felt that this would disrupt their personal lives outside of working hours. Meanwhile, the only key area that both parents and teachers agreed upon was the over-reliance on technology and degrading traditional skills such as writing. When all was put together, there was little incentive to embrace changes concerning ICT for school-related use.

4.3. Discussions

4.3.1 Taking Advantage of Student Usage Patterns
The initial results of this study show some distinct patterns of ICT usage among students. Students have fewer restrictions in their personal lives concerning technology. Therefore, it can be implied that a true sense of which services and applications are being used can be seen in their personal usage. The most noticeable usage pattern among students was messaging services. The most popular messaging service in Japan, Line, with 40% of the Japanese population using the service at fifty million users as of 2015 (Charles), was the most dominant messaging service. As Line groups create an online community, it becomes a natural extension of the classroom or club. In an unofficial capacity, many students already benefitted from this service as important information was spread to club or classroom members in a convenient and timely way. Some teachers from Kanagawa Prefecture took significant risks in allowing such communities to exist and found that the benefits and convenience were great, despite their concerns about misuse and their lack of authority or control on the platform. The school does not have an official stance on the matter, but generally, social networking services have a negative image in the teacher's office due to the risks of cyberbullying, digital device obsessions, student tensions from the difference in purchasing power between families, and the lack of control schools have in how the school image and students are portrayed on the Internet. Some teachers outright ban Line groups vocally, but since there is no binding school regulation or law, many students and parents continue to use Line groups as they feel that the convenience outweighs the risks.

4.3.2. The Case of Productivity

The results for productivity applications were low during the observation process, with over 70% of the students never using productivity apps at all. This number could potentially change once they enter high school or college, but considering that junior high school is the final level of mandatory education in Japan, it is important to recognize the lack of experience students have in ICT productivity. Additionally, after examining the usage of music and video services as well as games, it seems that students are being cultivated to be consumers, not creators. According to the survey results, only a few students can create content, while the vast majority only know how to consume it.

This is an issue that should be addressed when developing milestones for junior high school ICT plans. This is in line with the findings by MEXT based on the 2009 PISA results in that students in Japan are good at extracting information but poor at creating interpretations and connecting such information with their own experience (MEXT 1). It can be said that mandatory education does not provide students with the minimum level of information literacy as proposed by MEXT (6) and instead functions only as a social ritual of schooling. In other words, schools are just going through the motions of providing information education while focusing on entrance examinations and other traditional previously established test routines. Considering the amount of budget, time, and energy being spent on secondary education, it is in the best interest of policymakers to consider certain levels of ICT productivity competence among junior high school graduates when designing future school policies.

To develop schools to be better fit for the future, a need for more facilities was emphasized during the initial phase of ICT reform at schools in Japan (Vallance, 281). However, the current state of the case study school showed that facilities alone cannot change the perception of ICT and usage patterns. Regulations and restrictions play an important role in either facilitating or hindering the usage of ICT at schools. Additionally, because student assessment is based on the ability to repeat previous knowledge, the purpose of using ICT is not necessary in class since textbooks already have previous knowledge written in print. Parents mentioned in the interview that in the case of word processing or Internet searching for homework or projects. They let the students brainstorm while the parents assist with computer-related tasks. Thus, parents helped with the ICT while the students focused on the content, further cutting short any ICT-related educational experience for the student.

The parents at the case study school were not alone, as entrance examinations for high school and college traditionally dominated the core interest of schooling in Japan (Bjork *et al.* 620). Due to ICT literacy being absent from qualifying for higher education, it is understandable that parents perceive ICT as a non-essential part of schooling.

Two of the neighboring schools benefited from being independent of public school policies, as they are experimental (pilot) schools and private schools. One key area that was visible was the amount of ICT education as well as its usage in other subjects such as English and science. Teachers interviewed in those schools expressed a more positive

outlook towards using ICT, and a comparative study in the future may have further implications for public schools.

4.3.3. Resistance to Change

The concerns teachers expressed during the interview were not political, as previously researched by Aspinal (2011), but practical, as they centered around personal privacy, the risk of responsibilities for student actions, and a general lack of support to bring about significant change with ICT. One scholar in Japanese education, Leonard Schoppa, has been quoted numerous times in his studies on government conservatism in educational reform. Schoppa mentions the clash of opposing government policies as a barrier to swift progress in educational reform in the past (Schoppa, 1991). Based on Schoppa's studies on education reform, one can assume that currently, a clash of different political agendas concerning ICT could have played a role in various levels of resistance to the ICT policies being implemented. However, in the case of ICT, the new policy goals appear to be clear and uniform between the cabinet, MEXT and MIC (MEXT, 40). What is lacking is not an agreement in ICT utilization, but the know-how and specifics of implementing it in the real-world scenario of schools, which involves convincing the students, teachers, and parents of the positive aspects of change concerning ICT. Results from the student survey show more insight into this matter. In most categories over 70% of students responded with wanting to keep the status quo and no changes being made in the current system. This prompted the question if students resist change due to inconvenience or because they, nor their teachers, do not know what the positive implications of ICT are or feel it is not related to them in a practical way. An area of consideration on this matter is the misalignment of perceived benefits and drawbacks between teachers and parents. When parent expectations for ICT are the elements that worry the teacher, it is difficult to begin a productive dialogue.

5. Recommendations

In regard to these findings, regulations for school-related online communities, such as Line groups, require review. This is because, although the general atmosphere of the school is to keep Line usage taboo in an official capacity, the reality is that students are utilizing it on their own for school-related purposes. An area of concern with officially allowing such services, however, is the additional workload teachers would receive at undesirable hours and creation a system where teachers may be unfairly blamed for incidents outside of their control. Many teachers expressed their fear of becoming responsible for such incidents. Most of the teachers commented that it is better to be safe and ban the usage of online services in an official capacity to avoid unwarranted damage to the school. Thus, it seems that the mere possibility of privacy risks and misuse prevents the school authorities from embracing the messaging culture of the students, despite acknowledging it to be the most powerful force of communication outside of school. A potential remedy is to develop educational programs and provide them on a continued

basis in order to build the digital literacy of students and staff. These programs should not only highlight proper ICT ethics and usage, but also emphasize the nature of responsibility and consequences to students, teachers, and parents to create a shared understanding on the issue.

During the observation period and through interviews with PTA members, it seems that most houses have at least one computer, but most students do not own their own personal computers and rely heavily on their smartphones for most tasks. While family computers are available for students, PTA members commented that students seldom use it or that the computer itself is outdated. Judging from the ownership of older computers while having newer smartphones and tablets along with the average income of the Midori-Ward residents, it can be implied that this phenomenon is not based on the lack of purchasing ability but the lack of need. Computers are playing less of a role in daily computing as smart devices take over basic computing needs such as communication and entertainment. This is in line with many technology leaders proposing that the role of the traditional computer will transition to mobile devices as tablets and smart devices surpass traditional computer sales (Anthony). Thus, policymakers should avoid concentrating on traditional computers and take notice of what devices are actually being used by the students to determine the best way to bolster the reception and adoption rates of initiatives and programs.

Another focal point for students and parents was the entrance examinations. Since the current examination system does not require ICT, it is to be expected that there would be a lack of interest in the matter. Readjusting testing policies to include creative productivity output and amending outdated regulations that act as barriers can better facilitate ICT utilization at schools and help policymakers find the first step they need in bringing ICT into the school environment in a more effective way. With these elements in mind, educational goals and assessment methods would first need to make adjustments for any ICT usage in academics to be taken seriously by the students and parents. One potential direction would be the increase of more critical and creative thinking evaluations that would require students to be more active in their information gathering and synthesis.

Most important is addressing the human aspects of ICT related fears and resistance, especially by the teachers. This is simply due to the fact that the teachers are the end-users of any policy regarding ICT, and a combination of fear of the unknown and being subjected to additional responsibilities regarding something as difficult to regulate as Internet-usage can easily be a deterring factor in implementing any policy regardless of how robust it may seem. The other side of the human aspect is the student. If the student does not appreciate the practical benefits of ICT, it will be difficult for them and their parents to take the program seriously.

6. Conclusion

In conclusion, it is important to recognize the significance of the human aspects of ICT. In this study, ICT usage patterns for students and teachers at the case study school were derived as well as their perception on the importance of ICT in the education system. The final thoughts in this article are about the importance of a balanced implementation of ICT by adjusting to the student situation and needs as well as the positions of the teachers. Taking advantage of the most accessed services and technologies available was discussed as a potential to start ICT implementation smoothly. This study highlighted the need to address policies and regulations in order to bring the balance of authority and responsibility between parents, teachers, and students. There are times when initiatives can efficiently guide users to experience more convenience or productivity, while there are other times when such initiatives can frustrate users more than aid them. Therefore, it is important to look into the details of the student and teacher lifestyles to grasp the human aspect of ICT and understand the background and thought process of the users. Case studies that combine quantitative data in conjunction with qualitative observations can bring the necessary insight for policymakers to make the best use of their specialties, which include areas such as content development, infrastructure, teacher training, and many other aspects of school management. Additionally, case studies can help develop promising pilot programs if necessary. These processes will contribute to the smooth implementation of ICT in public education.

Further study is recommended in following up on the visited schools after a period of time to see if any changes in policy occurred and what resulted from such changes. Additional data from surrounding schools in the area can contribute to assessing the situation of suburban Japanese schools and technology more accurately. In particular, as mentioned in the discussion, a comparative study of public and private schools in the same area may provide valuable findings and discussion points for implementing ICT effectively. Such studies can open the door to deepening the understanding of the teachers and students in Japan. By strengthening the process of developing future schools for Japan, further studies can contribute to the advancement of the future economy and society as a whole.

This study highlighted the importance of understanding the lifestyles and thoughts of the end-users of technology initiatives at a suburban secondary school in Yokohama and illustrated a detailed example of why it is important to understand the human aspects of ICT in order to implement such technologies effectively in the schools of suburban Japan. Even if ICT is implemented due to limitations imposed by the pandemic, to sustain any usage and further develop policies to be in line with current technology, understanding the human aspects of ICT and the perception given by teachers and students will always remain important.

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Conflict of Interest Statement

The author declares no conflicts of interest.

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Soonbo Nicholas Woo graduated from Waseda University with a Masters in International Relations. Prior to his graduate education, he served under the Deputy Commander of the United Nations Command as an Air Force officer and international coordinator for several projects between the United States and South Korea. His main research interests include education technology policies, communication studies, American Studies and East Asian studies. He has 13 years of secondary education experience in South Korea and Japan, mostly in Kanagawa Prefecture as an English teacher and club coordinator. He is the author of several English language education books in Japan and has provided workshops related to ICT in education at various educational institutions and offices. At the time of this publication, he is teaching subjects in Communication Studies, American Studies, International Relations and Analytical Writing at Temple University Japan Campus, Kyoritsu Women's University, and Mejiro University.

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