Doctoral Dissertation

Recontextualizing Teacher ICT Capability in Geographically Isolated and Disadvantaged Areas at the Time of COVID-19

(Summary)

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This research is an attempt to come up with a new concept of teacher ICT capability that would work in remote rural areas at the time of COVID-19. It built on the TPACK framework to identify the kind of ICT capability that teachers must have in geographically isolated and disadvantaged areas to ensure the provision of quality education amid the current COVID-19 crisis. This study started in 2018 to examine the ICT capability of teachers in GIDA and how they were able to overcome the challenges associated with teaching in remote rural areas, to successfully implement ICT-integrated lessons. But COVID-19 came. So, to make this study more relevant to the current situation in Philippine education, this study expanded its scope to include teacher ICT capability at the time of COVID-19. It examined how the ICT capability of teachers in a geographically isolated and disadvantaged environment transformed during COVID-19.

Specifically, it answered the following questions:

1. What teacher ICT capability do teachers in geographically isolated and disadvantaged areas in the Philippines have before COVID-19?
2. How has the ICT capability of teachers in geographically isolated and disadvantaged areas transformed during COVID-19?
3. Based on the results of the study, what new form of teacher ICT capability was formed and how this capability was recontextualized for geographically isolated and disadvantaged areas?

COVID-19 provided a new environment to the Philippine educational landscape. The teachers, trained to teach in physical classrooms, were compelled to design lessons from remote set up. This means that they have to optimize the use of ICT tools and implement teaching strategies that would facilitate student learning while at their homes. This change in the learning environment entailed the revisit of existing teacher capability and examination of how this capability could be utilized to cope with the challenges of COVID-19. The remote rural areas are referred to in this study as geographically isolated and disadvantaged areas (GIDA). GIDA are communities with marginalized populations, physically and socio-economically separated from the mainstream society and characterized by isolation due to distance, weather conditions, and transportation difficulties (https://www.doh.gov.ph/node/1154).

Research Methodology

The study used a mixed-methods embedded research design. The focus of the research is on the teachers' use of ICT in selected schools located in three major regions of the Philippines coded as follows: Luzon (GIDA1), Visayas (GIDA2), and Mindanao (GIDA3). Three study schools for each GIDA were chosen. GIDA1 represented the geographically isolated and disadvantaged areas in Luzon, located in the northern part of the Philippines. GIDA2 means the GIDA areas in Visayas, which is located in the central part of the country. GIDA3 refers to the sites in Mindanao found in the southern part of the Philippines.

The schools were selected based on the following: located in remote, rural villages; technology (traditional and digital) integration is evident in the delivery of instruction; and with Science teachers teaching in Junior High School.

This study has as key informants the junior high school Science teachers. It focused on

Science teaching at the junior high school level for following reasons:

a) It follows a uniform curriculum unlike in senior high school where its academic strand has specific tracks. Upon reaching senior high school, students can choose from among the four tracks namely Academic, Technical-Vocational Livelihood, Sports and Arts

b) The curriculum is implemented in spiral progression. This means that with the spiral approach, the learning process is facilitated by building upon previously learned knowledge. Through this approach, students are able to master the desired competencies by revisiting the subject several times and relating new knowledge or skills with the previous one

c) The teachers have to teach a Science discipline that is not his or her major field. Science teachers are expected to teach science subjects other than their major program in their pre-service education. For example, a teacher whose major is Chemistry also teaches Physics, Biology, and Earth Science.

Qualitative and quantitative data were gathered before and during COVID-19. The first set of data was collected between the months of November 2018 and February 2020. Before COVID-19, data were sourced from interviews, document reviews, classroom observation, questionnaires, and focus group discussions. During COVID-19, sources of data were interviews with teachers and student quarterly scores, that were collected during the period November-December 2020 and April-August 2021. Gathering of data was hampered by the COVID-19 restrictions. Due to this, the study resorted to virtual platforms to follow up on data that were still needed to be collected from participants. Internet connectivity and unavailability of the teacher-participants also affected the schedule of data collection.

Descriptive statistics that included frequency, percentage and weighted mean were utilized to analyze the quantitative data. These consisted of responses in the questionnaires, student perception survey and classroom observation guide. For the pre-post tests and quarterly grades of the students, t-test was used, and frequency/percentages.

For the qualitative part, the participant's responses to the open-ended questions in the questionnaire and the interview data were analyzed with the use of codes and thematic analysis of field notes. As the analysis was ongoing, themes were continuously reviewed for overlap and completeness. For data validity, triangulation of teachers' responses during interviews and online questionnaires on ICT utilization and competencies were done. The results were used to justify the themes established during the analysis.

Member checking was performed for a deeper understanding of the teachers' responses and validated the qualitative and quantitative findings. This likewise helped minimize the bias of self-report.

Findings

Based on the results, this study found answers to the research questions, as follows:

1) The teachers even before COVID-19 have high ICT utilization and high competency in using ICT in designing and delivering their lessons. The regular conduct of training programs, that included topics on ICT, equipped them with the knowledge and skills needed to design and implement ICT-mediated instruction.

2) The transformation of their ICT capability was ushered in by their rich technological and pedagogical knowledge in using ICT, the challenging experiences that they had encountered even before the pandemic, their mindset to help students cope with the difficult situation and the strong support from the national and local government, school administrators, and peers. Teachers built on their existing teacher ICT capability to enable them to cope with the difficulties of teaching in GIDA at the time of COVID-19. They supplemented their ICT capability with the experiences they have had in the past. Despite the limited technological devices and unstable Internet and power supply, they have become more resilient in ensuring that learning continues. Their high competence and positive attitude towards the use of ICT enabled them to be flexible in the design of their ICT-mediated instruction despite the limitations. The adjustments they made to cope with the challenges of remote teaching during COVID-19, is viewed by this study to have recontextualized their teacher ICT capability

3) The new concept emanated from the ICT capability of GIDA teachers before COVID-19 (Research Question #1), the transformation in their ICT capability and the factors that propelled the change at the time of COVID-19 (Research Question #2). The recontextualized teacher ICT capability is framed within the context of geographically isolated and disadvantaged areas during COVID-19. It reconstructed the TPACK model with three of the knowledge components forming the inner core of the new concept of teacher ICT capability, namely technological knowledge, pedagogical knowledge, and technological-pedagogical knowledge. It also included the factors within and outside the classrooms that are found to be influencing the updating and upgrading of the teachers' ICT capability. It added the concept of *kaizen* as the force that drives the recontextualized framework to be consistently attuned to the changing learning environment. The recontextualized framework included the factors outside the classroom such as support from local government support, policies, organizational support, ICT infrastructure and resources and support among peers or co-workers.

The Recontextualized Teacher ICT Capability Framework

This study identified the components of a recontextualized teacher ICT capability that describes the capability that teachers must have to adopt to school disruptions as caused by natural disasters, armed conflict, pandemic and other socio-political issues. The findings enabled this study to reconstruct the TPACK model to make it aligned to the new concept of teacher ICT capability that works in GIDA. The new concept highlights the capability to overcome the challenges associated with teaching in GIDA such as lack resources, intermittent supply of electricity, inadequate technological resources, difficult terrains, and inadequate teacher training on ICT.

At its inner core is the basic knowledge and skills that teachers must have to promote effective teaching with ICT even in difficult situations. To be called the cognitive dimension, this consists of three TPACK components - technological knowledge, pedagogical knowledge, and technological-pedagogical knowledge. This is the default competency that all teachers, whether teaching in the urban or remote, rural areas must have to effectively teach their lessons with the use of ICT. This dimension encompasses the teachers' knowledge of the technology and its potential to enhance learning (technological knowledge), integrating this knowledge when teaching the lessons (pedagogical knowledge), and designing ICT-mediated lessons that utilize appropriate technological

tools and effective teaching strategies using ICT (technological pedagogical knowledge)

The concept also includes the layer known as affective dimension. The knowledge of the technological tools and how to effectively integrate these tools in teaching their subject areas, must complement with the skills comprising this dimension, namely resilience, empathy and *Uido*.

- Resilience is the ability to adapt well to difficult situations and be able to recover quickly. For example, a teacher expressed her confidence that they will be able to recover from this crisis the same way they were able to survive the devastating typhoon that hit their area in 2013.

- Empathy is the ability of the teachers to see themselves where the students are, foresee the challenges that they may face, and take preemptive actions to prevent grave consequences of these challenges.

- *Uido* describes the teacher's ability to apply instinct and intuition to improvise and innovate despite the limited resources in remote, rural areas. *Uido* is an inherently Filipino language that means innate talent, or knowledge "learned by ear". It was adapted in the new concept because it fully captures the teachers' improvising and innovating based on instinct and intuition especially in times of difficult situations.

The recontextualized framework likewise incorporated the philosophy of *kaizen,* identifying it as the force that enables teachers' capability to be flexible in dealing with difficult situations. The philosophy of *kaizen* was adapted in the study to describe the continuous efforts of the teachers to institute innovations and improvisations. It also takes into account the initiatives of the teachers to upgrade and update their knowledge and skills in order to become effective teachers. It embraces *kaizen*, which in the context of ICT-enabled instruction, refers to the continuous process of enriching and updating the course content, and the strategies by which instruction is delivered.

The 4th component consists of the contextual factors that exist on their own yet influence each other in the implementation of programs and activities related to the schooling of the children. The factors comprise the following:

- Local government support refers to the assistance the local government units (LGUs) and barangay (village) officials provide to the schools and teachers. These include the provision of funds, school supplies, safety and protection to school staff, teachers, and students, and information dissemination.

- Family Participation refers to the indirect support the parents or guardians give to the teachers. The remote learning approach compelled parents and guardians to take on the major role of teaching the lessons through modular learning, with the teachers assisting them. Teachers cited that the success of remote learning among students depends greatly on the level of involvement of their families.

- Support among teachers refers to the assistance provided to one another by teachers to achieve the goals of their schools and provide quality education to the students. Collaborating with their fellow teachers strengthened their sense of community among the school leaders, teachers, and staff. They were given the opportunity to work together especially in developing ICT-based instructional materials.

- Organizational support refers to the programs being implemented by the Philippine Department of Education and other stakeholders of their school. These include teacher professional development, provision of incentives, and strong support of the school administrators.

- ICT infrastructure and resources refer to the ICT technological resources that are needed by and available to the students to participate in remote learning. This also includes the teacher's access to ICT resources that they use to communicate with students and deliver instruction. The present set-up limited the teachers' use of ICT to communication and materials production. All schools were encouraged to implement classes remotely, using both synchronous and asynchronous approaches. Schools in the cities were able to implement remote online learning but most of the schools in geographically isolated areas were faced with the challenges of poor Internet connectivity and inadequate technological resources for the students' use.

- Policies are the guidelines issued, and restrictions imposed by national and community institutions, in relation to the conduct of classes, that are challenged by a health crisis, security and safety, and natural disasters. These policies prevent them from conducting face-to-face classes and limit them from doing home visitations to check on the welfare of their students. In the Philippines, DepEd aligned all its policies relating to school closures and other activities on the guidelines released by the Inter-Agency Task Force for the Management of Emerging Infections Diseases (IATF) (https://iatf.doh.gov.ph/).

Conclusions

This study identified the new concept of ICT capability. Called the recontextualized teacher ICT capability, it is expected to be the teacher ICT capability that could work in GIDA. The new teacher ICT capability did not emerge on its own. Teachers naturally instituted self-reforms to cope with the difficulties of teaching in GIDA. And with the force of *kaizen,* they have been enabled to be flexible in dealing with the situations.

The recontextualized concept adheres to the uniqueness of each GIDA studied. The presence of indigenous peoples in GIDA1, the difficult experience the GIDA2 have had due to the massive devastation of a strong typhoon, and the instability of peace and order in GIDA3, shed light on how teacher ICT capability transformed at the time of COVID-19.

Based on the findings, the study came up with the following conclusions:

Teacher ICT capability before COVID-19 (Research Question #1)

The high ICT capability of teachers in GIDA can be attributed to the sustained implementation of professional development programs for teachers. Their regular participation to training programs, that included topics on ICT, provided them with the needed knowledge and skills in designing ICT-integrated instruction. This also alluded to the teachers' positive attitude towards technological innovations and recognition of ICT to facilitate learning.

Teachers, whether teaching in GIDA or non-GIDA, amid pandemic or without, possess the technological, pedagogical, content knowledge that is fundamental to effect meaningful and skilled use of ICT in teaching. Yet, this has to be constantly updated and upgraded to make teaching and learning attuned to the continuously changing learning environment.

Transformation of teacher ICT capability at the time of COVID-19 (Research Question #2)

The transformation of their ICT capability is built on their rich technological and pedagogical knowledge in using ICT, the challenging experiences that they had encountered even before the pandemic, their mindset to help students cope with the difficult situation and the strong support from the national and local government, school administrators, and peers. The reforms they instituted to cope with the challenges of remote teaching during COVID-19 recontextualized their teacher ICT capability.

Teachers counted on their existing teacher ICT capability to enable them to cope with the difficulties of teaching in GIDA at the time of COVID-19. They supplemented their ICT capability with the experiences they have had in the past. Despite the limited technological devices and unstable Internet and power supply, they have become more resilient in ensuring that learning continues. Their high competence and positive attitude towards the use of ICT enabled them to be flexible in the design of their ICT-mediated instruction despite the limitations.

Teachers in GIDA face each day the inadequacies of resources and access to basic services. They are also exposed to an environment that had seen many disasters such as devastating typhoons, drought, or armed conflict. Yet, teachers had to stay at the forefront to keep the students learning in areas like GIDA at this time of the pandemic. They had to count on their human capabilities and keep that teacher's mindset to "create more and give more to reach the students". Their high technological, pedagogical, and content knowledge even before the pandemic, their exposure to situations such as difficult terrain, devastating and man-made disasters in the past, helped them develop a new form of capability that enabled them to tide over the challenges of remote learning.

New teacher ICT capability concept (Research Question #3)

The recontextualized teacher ICT capability is found to be the new teacher ICT capability that will work in GIDA communities. It consists of four components: cognitive dimension; affective dimension; kaizen; and contextual factors. The cognitive dimension consists of the ICT knowledge and skills that teachers must have to effectively teach their lessons in today's digital learning environment. The affective dimension is the additional layer that would enable the cognitive dimension to function at the time of COVID-19. It has the 3 supplementary skills identified in this study as Resilience, Empathy and *Uido*. This is to factor in challenging situations present in GIDA at the time of pandemic and other related international and national crises. The recontextualized capability also recognized the efforts of the teachers to cope with the challenges of the remote set-up. These efforts were seen by this study to have contributed greatly to the learning continuity of students and the formation of a new concept of teacher ICT capability. And based on these findings, the philosophy of *kaizen* was found to be the force that propels the continuous updating and upgrading of this new teacher capability. *Kaizen* is reinforced through continuing professional development of teachers, exploring existing and emerging technologies that influence instruction, and modification of strategies to make learning more relevant and accessible to the learners. The factors outside the classroom are likewise identified: local government support, policies, organizational support, ICT infrastructure and resources; and support among teachers.

This study argues that the TPACK framework viewed to be a strong theory on ICT integration by academic scholars is not enough for the kind of ICT capability that teachers must have to cope with the difficulties of teaching in GIDA at the time of COVID-19. This study reconstructed the TPACK model that sees the technological and pedagogical knowledge components as a measure of teacher ICT capability for successful use of ICT in the classroom. It identified the essential components for a teacher ICT capability that would work in GIDA in COVID-19. The cognitive and affective skills, the *kaizen* that works in the background to ensure that these skills are continuously improved and attuned to the needs of the schools and school children, and the support and cooperation of relevant groups and institutions established the recontextualized teacher ICT capability that for GIDA.

Limitations, Recommendations and Way Forward

This study was not able to conduct fieldwork during COVID- 19 due to health protocols and travel restrictions imposed. Future research could include fieldwork to pilot-test and document the relationship between the new teacher ICT capability and quality of education.

Researchers could also work on other content areas such as Mathematics, STEM areas and other academic fields that use of ICT must be optimized to facilitate concept learning. Research applying the framework to instructors of tertiary education could also provide a different context in using ICT to expand human capabilities at the time of national or global crisis.

Future research could conduct a deeper examination of the components of the recontextualized teacher ICT capability in relation to the unique character of each GIDA. The research would give insights into how each component would specifically function in varying settings.

This study recommends that the recontextualized teacher ICT capability be applied to refugees' education and to other Asian and African countries whose education systems are likewise challenged by technological, socio-economic, health, environmental, and armed conflicts issues. This new concept of ICT capability can also provide relevant insights in the teaching of disaster management to senior high school and tertiary education students, where the principles and practices of natural disaster risk management are taught with an emphasis on mitigation and adaptation through all related disciplines that aim for resilience.