UNIVERSITY OF THE PHILIPPINES
OPEN UNIVERSITY

BACHELOR OF ARTS IN MULTIMEDIA STUDIES

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Exploring Information and Communication Technology Access and Awareness Among People with Disabilities

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June 2019

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Acceptance Page

This Thesis titled Exploring Information and Communication Technology Access and Awareness Among People with Disabilities is hereby accepted by the Faculty of Information and Communication Studies, U.P. Open University, in partial fulfillment of the requirements for the degree Doctor of Communication (DCOMM).

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Biographical Sketch

James Harvey Maceda
Bachelor of Arts in Multimedia Studies

The author, James Harvey Maceda, was born on February 16, 1997 and currently residing at Navotas City, Philippines. He is the only child of Anita Cruz and Jaime Maceda. His parents were unfortunately separated so he grew up with his aunts on his mother side. He never personally met his father while his mother needed to work abroad ever since he was a child.

Growing up with a separated family was not easy so he set this as his motivation to strive harder and reward his mother with good grades in return for her hard work of raising him alone. He graduated at La Naval Academy during his primary education while he took his secondary education at St. James Academy where he was a consistent honor student. On the other hand, James is not only academically inclined but also passionate in various forms of Arts. In his four years in the academy, he had been an active student. He was a member of the theatre guild during his third-year high school and was able to perform on major events such as the academy's 85th anniversary. His passion for arts did not stop during college as he joined the UP Open University Cyber Street Dance Company where he is one of the students who performed and represented UPOU on UP Lantern Parade 2015. He is now a member of UP Iris, a photography organization of the university and is very interested in videography and filmmaking. He loves to participate in creating films whether being an actor or being part of the production team. He once won a film competition held by Change Foundation Inc. where he was the main actor. He also managed to direct his first film titled "Bangon" which has been an entry for a film competition led by Quisumbing Escandor Film Festival for Health regarding mental awareness. Currently, he is a freelance videographer and photographer where he covered Nora Aunor's 50th Golden Anniversary Celebration in showbusiness.

Acknowledgement

I am sincerely grateful to God Almighty for providing me the good health, wisdom, guidance, support and well-being that were necessary in completing these project and production.

I would also like to express my special thanks of gratitude to my adviser, Dr. Alexander Flor, PhD., who supported, shared valuable guidance and gave me the opportunity to create this wonderful project and production. I sincerely thank my mother for the never-ending support especially in terms of my financial needs in materializing the project. I also like to express my sense of gratitude to Grain Foundation for People with Disabilities Inc. for being part of my journey as I accomplished the documentary. I am also grateful to my family and friends who encouraged me and shared their wisdom for the betterment of the manuscript and the documentary video.

Finally, I also place on record, my sense of gratitude to one and all, who directly or indirectly, have lent their hand in this venture.

Dedicated to:

All People living with
Disability

Table of Contents

Chapter One

THE PROBLEM AND ITS BACKGROUND

Introduction

Information and Communication Technologies (ICT) are technologies that involves telecommunications, broadcast media, intelligent building management system, audiovisual processing and transmission system, and network-based control and monitoring functions. It is a collection of tools used to communicate, create, distribute, and store a large amount of information. It promotes accessibility which accessibility is the key to development that is why it has been an essential component in various aspects of a certain society. ICT access in the Philippines resulted to some possible advantages such as improvement of its educational status, easier and more efficient business management, improved government services, and even fortifying the country's economy. However, one major problem that modern societies are experiencing in the information age is the digital divide where disability divide is a major contributor in the widening gap of this division.

According to statistics held by the Census of Housing and Population of the Philippines last 2010, of the 92.1 million household population in the country, 1,443 thousand people or 1.57% has a disability (Philippine Statistics Authority, 2013) and it is not unlikely for this number to increase in the succeeding years. Despite of this, more technologies are made just for general consumers that do not consider accessibility for PWD . There are over a billion around the world who are hindered to access ICT due to their disability, restricting PWD on the opportunities the information age has to offer. Fortunately, there are ICT initiatives that are promoting the creation of Assistive Technologies (AT) that will improve PWD's access to ICT conveniently. ICT enhances the status of education all over the world through the help of AT that will help students with disabilities such as hearing, visual, physical, and/or cognitive impairments to participate and enjoy the educational process that they need to go through, with special treatment for their cases. Furthermore, the UNESCO (United Nations Educational, Scientific and Cultural Organization) advocates the rights and needs of persons with disabilities and fosters the effective use of ICT that are accessible, adaptive, and affordable.

However, the rapid developments in digital technologies have been a disruptive force in the field of assistive and adaptive technologies because they have brought many of these specialized functionalities within the domain of general consumer and personal technology (Raja, 2016). As accessibility to modern technologies becomes difficult, opportunities and media literacy among PWD will also start to decline. The internet and digital technologies are also changing how entrepreneurs, people who

are self-employed, and free-lancers are raising capital, finding clients, and selling services. This also means that if PWDs are unable to access these technologies, they will be further disadvantaged in the digital workplace (Partnership on Employment and Accessible Technology, 2014). Meanwhile, specialized assistive and adaptive technologies such as screen reading software, magnification devices, augmentative and alternative communication (AAC) devices that aid persons with difficulties in verbal communications, and telecommunication relay devices have been used to promote independence and participation. However, persons with disabilities in low and middle-income countries face significant challenges in acquiring assistive devices such as the cost and availability of standalone, specialized equipment (WHO and World Bank 2011). These costly technologies will be a notable benefit to those PWD who can afford it but a great disadvantage to those who cannot, since accessing AT that will hopefully make them an active member of the modern society and give them opportunities in social, cultural, political and economic integration in their communities are even hindered by its costly amount.

Majority of the people are not fully aware about the case of PWD in the information age, especially in developing countries like the Philippines. Although, there are multiple numbers of non-government organizations (NGO) who support PWD, these are not enough to cover millions of them in the Philippines. The Philippine government passed several laws for the privilege and certain benefits for PWD such as discounts to goods and other purchases, and express lanes to certain buildings and establishments. However, the researcher believes that these benefits are not enough since opportunities play a major role in improving one's life.

As a result, the researcher aims to answer the following research questions:

"What is the importance of ICT access to PWD?"
"What are the advantages or potential benefits ICT access presents to PWD?"

Objectives of the Study

The study aims to raise awareness about the PWD hindered in accessing ICT and other multimedia products, specifically, it seeks to discuss and identify the following objectives:

- Discuss the importance of ICT access to PWD.
- Identify the possible advantages or how ICT access can help PWD.

Significance of the Study

The virtual reality documentary produced by this study will raise awareness about the present condition of PWD in the information age and how opportunities for them are hindered through certain factors. In addition, the documentary may have an indirect benefit for all PWD by inspiring ICT initiatives to further help PWD in accessing multimedia products. For instance, an improvement to Assistive Technologies (AT) will greatly help in narrowing the disability divide and providing more ICT-related opportunities for PWD.

While the study focuses on PWD, it can also help people without disabilities by realizing how important ICT access is. Therefore, maximizing their potentials in the information age knowing that they are able enough to do certain works.

Chapter Two

REVIEW OF RELATED LITERATURE

Widening Gap of Disability Divide

The definition of people with disability (PWD) does not apply exclusively to whom possesses one type of disability (e.g., hearing impairment, motor, vision impairment and intellectual) but also applies to whom, in any moment or situation, experiences incapacity to access to a content or service (WHO and World Bank, 2011).

Access to ICT has been a vital resource to survive and participate in the ever-growing modern society. Nowadays, new technologies encourage the universality of users in the access to internet, but also increases problems of accessibility in terms of not considering the individual differences in the construction of accessible contents (Peres et al., 2012). Many technologies are intimately associated with our bodies and have a complex relationship to impairment and disability. Thus, the introduction of new technologies can create new forms of exclusion for PWDs. There is little doubt that PWDs have the knowledge, skills, and willingness to use information technology. (Lindsay, 2010) However, if there will be a constant hindrance for them in accessing modern technology, then they might lose all motivations to acquire knowledge and skills in the field of ICT that will further deprive them of opportunities. If an individual does not possess the skill-set required to adequately use technology and does not have the motivation to change this shortcoming, then the impact of social, technical and financial factors becomes marginal (Sachdeva et al., 2013).

Media or digital literacy of people with disabilities. With appropriate media literacy training, delivered either through webcasts, YouTube tutorials, community and social centers and outreach programs, people living with disabilities can be prepared to make use of social media to enable them to more fully participate in society. Media literacy can even enable people living with disability to work remotely, countering comparatively low levels of employment. Media literacy education for people living with disability provides a safe and effective channel to participate in a full and active life (Thompson, 2018). On the other hand, some PWD lacks motivation in learning the field of ICT since they are not fully aware of its advantageous and beneficial effect. For instance, people with disabilities, specifically, people who are vision impaired, are not embracing computing and Internet-related technologies at the same rate as the able-bodied population (Hollier, 2007).

In addition, media literacy interventions suggested that the interventions affected many outcomes, leading to increases in knowledge, perceptions of realism, self-efficacy and behaviors, demonstrating the value of media literacy to have a range

of positive impacts to students with disability. While both media literacy practices of analysis and production can promote various skills, the issue of access is still the major barrier for students with disabilities (Friesem, 2017). Knowledge is power, so media illiteracy must be resolved for PWD to be a fully functional or active member of the modern society.

Expensive assistive technologies (AT). Assistive devices and technologies are the devices or software that increase mobility, hearing, vision, and communication capacities. People with different disabilities have a chance to have independent life and participate in the society (World Health Organization, 2018). However, experts feel that though technologies can bring about a revolution in the lives of disabled people, these are very expensive, and to make it affordable for everyone is still a distant dream (Asia-Pacific, 2011). Cost is often a major barrier for people with disabilities accessing the Internet because they often need assistive devices and adapted technology, which can be expensive. This is further complicated by the fact that people with disabilities often have lower incomes than people without disabilities and thus, may not be able to afford an adapted computer (D'Aubin 2007). As the market for assistive technology keeps expanding, disability experts said that the focus now is on how costs can be lowered and who should pay for the technology (Radu, 2017). Governments can develop different types of financial assistance schemes to offset the cost of assistive technology such as loans and grants to support purchase of assistive and accessible technologies and to reduce cost of imported AT by waiving customs duties and fees (Raja, 2016).

The principle of non-discrimination suggests that all people with disabilities have a right to demand available and affordable AT to assure their enjoyment of all human rights. Supplying the ATs to people with disabilities is a national responsibility as well as an international responsibility (Islim and Cagiltay, 2012).

Disability Divide as Socio-economic Issue

The internet and ICT can facilitate the social, economic, and civic participation of people with disabilities (Raja, 2016). However, the digital divide is increasing rather than decreasing, as the newest ICT innovations always derive from richer areas of the world, where funding, infrastructures, and above all, economical profitability are higher. On the contrary, developing countries not only receive what donors and organizations provide, but also tend to get equipment on the brink of being obsolete. Without clear economical profit, there is no foreseeable scenario, in the current state of global trade, that will deploy the latest ICT innovations equally around the globe (Conill, n.d.). Furthermore, researchers indicate that people with disabilities are less likely to be employed and if they do have a job, it would be under-employed relative to their educational level and low-paid with poor prospective. Also, their pension

provision is probably not going to provide sufficient funds to help them against poverty when they became older. They also suffer from some marginalization and exclusion from public services and community activities because of lack of transportation, access, opportunities, and negative discrimination towards the disability and in workplace (Andrade, n.d.).

Thus, the digital divide is a deeply misleading discourse: the divide is not digital but socioeconomic (Conill, n.d.). The adoption and use of accessible ICT for inclusion is dependent on many actors in the ecosystem including government service providers, educators, employers, development practitioners, and the ICT industry (Raja, 2016). “Societies will never achieve SDGs (Sustainable Development Goals) without the full participation of everyone, including people with disabilities. We cannot afford to ignore or marginalize the contribution of 1.5 billion people,” said UN Secretary-General Antonio Gutterres (UN, 2018).

Importance of Disability Awareness

For ages, PWDs experience exclusion from their society and experience stigma, stereotypes, negative imagery, etc. and it persists in the present time. Knowledge and attitudes are important environmental factors, affecting all areas of service provision and social life. Raising awareness and challenging negative attitudes are often the first steps toward creating more accessible environments for PWDs (WHO and World Bank, 2011). Moreover, limited knowledge and understanding on the side of innovators about disabilities and poor accessibility can pose significant barriers that prevent PWDs from receiving appropriate and effective treatment, services and supports. Raising awareness and expanding innovators’ knowledge, improving communication between individuals and innovators, and ensuring access to information and services are highly critical to the delivery of quality care to PWDs (VHCIP, 2015).

Chapter Three

METHOD AND PROCEDURES

Conceptual Framework

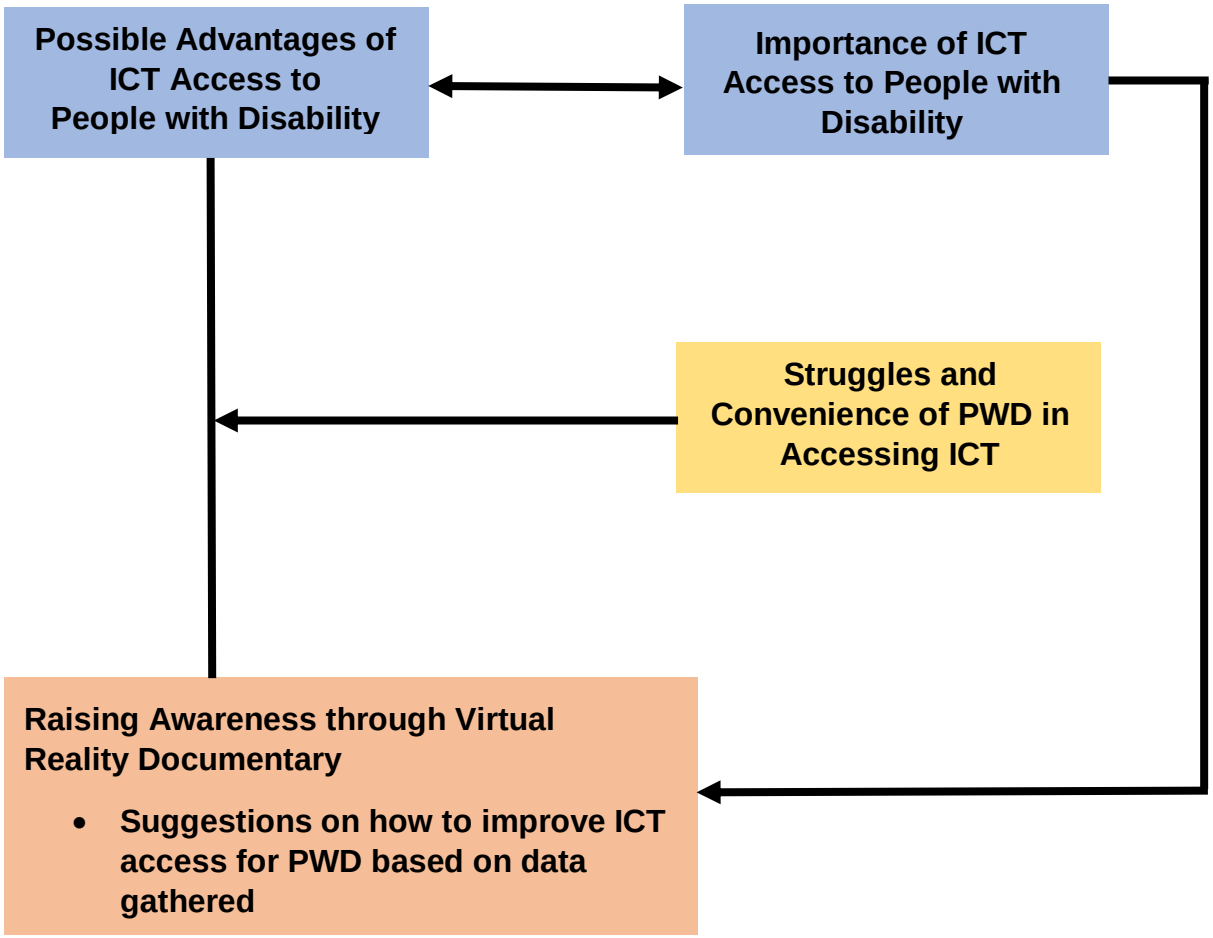

Figure 1. Flowchart used as a guide in accomplishing objectives.

Methodology

The researcher produced a virtual reality (VR) which is considered as the next major computing platform that will come after mobile according to Mark Zuckerberg (Niccolai, 2014). It holds the promise to be even more transformative than the flat Web was - reaching into every segment of every market and remaking it to be virtually accessible (Shuster, n.d.).

The documentary video using VR contains a compilation of personal semi-structured interviews of various individuals with different disabilities such as hearing and visual impairment, cerebral palsy, Attention-Deficit/Hyperactivity Disorder (ADHD), and Fanconi Syndrome.

Interview Protocol

Interview protocol presents how primary research questions were divided to multiple interview questions to achieve a more organized and clearer results. Interview questions were designed to answer the research questions. A total of 5 participants were interviewed at Grain Foundation for People with Disabilities Incorporated, a non-profit organization that aims to meet both PWD's physical and spiritual needs (See Annex A).

In preparation for interviews and materializing the VR documentary, the researcher had undergone the following processes:

Pre-production

Consent process. The researcher and social workers at Grain Foundation for PWD Incorporated evaluated and identified the participants that are eligible according to the inclusion and exclusion enlisted below.

Inclusion criteria

- Participant's disability is a hindrance in accessing ICT.
- Participants should own at least one technology.
- Participants must agree in recording a video of them being interviewed.

Exclusion criteria

- PWDs who are aggressive or violent.
- PWDs who cannot communicate totally.
- PWDs who have difficulty in comprehension due to their disability such as Wernicke's Aphasia.

Ethical consideration. Participants received a complete explanation about the study including the potential risks such as being uncomfortable in sharing and/or answering questions about their case and exposing their life to some extent. Potential benefits were also discussed, and a consent letter was given to be signed by them and their parents or guardians to avoid internal conflicts. Through this consent, the researcher assured that the study will not pose any harm or violation to others' rights. Moreover, they are informed that they can withdraw in the study anytime.

Block diagram and script outline. Figure 1 is a Block Diagram that the researcher used in planning his camera locations and movements as well as the narrator and other subjects' movement. This can be a counterpart of a storyboard in film production. Furthermore, lighting was observed, and movements are rehearsed prior to the production date. In addition, to further smoothen the production flow, the researcher used script outline that served as an additional guide to track during production. It shows the planned visual and the script and/or narration counterpart seen in Figure 2.

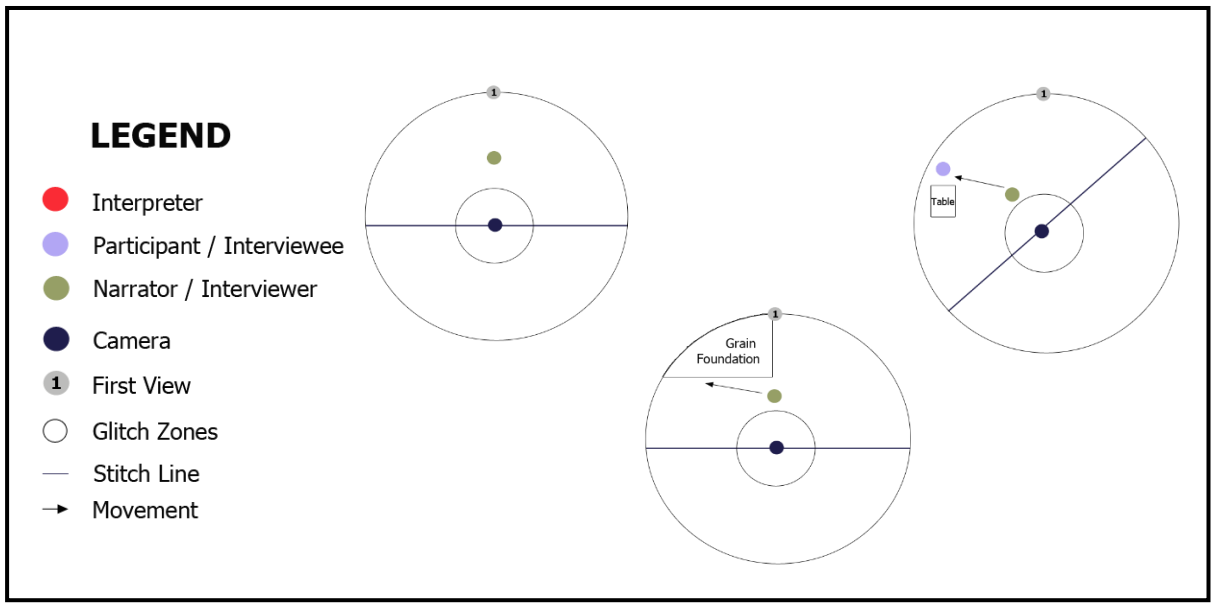

Figure 2. Sample block diagrams used for VR production.

Visual	Narration / Script
• Flash random places in the Philippines preferably - roads or beautiful scenery	Ang ating mundo ay nasa panahon ngayon ng impormasyon. Napapalibutan tayo ng iba't- ibang uri ng teknolohiya na ginagamit sa komunikasyon upang lumikha, magproseso, mag-imbak o dili naman kaya'y magbahagi ng impormasyon. Madali nating naipaparating ang ating mga opinyon sa nakararami sa pamamagitan ng mga kagamitang ito. Sa tulong ng teknolohiya, napabilis nito ang palitan at pagkalat ng impormasyon at napahusay ang estado ng komunikasyon dito sa Pilipinas. Ang patuloy na pagsulong ng mga ito ay naging isa sa pangunahing sangkap tungo sa kaunlaran. Mahalaga ito sa iba't ibang aspeto ng isang bansa tulad na lamang sa edukasyon, gobyerno, ekonomiya, agrikultura at iba pa. Ang mga indibidwal na bihasa sa paggamit ng mga ito ay talaga namang nakatatanggap ng napakaraming oportunidad. Subalit paano na lamang silang mga hindi marunong, hindi naabot ng teknolohiya o silang nahihirapan sa paggamit ng mga ito? (open for revisions or improvement)
• (Flash Title)	Ako si James Harvey Maceda, at ito ang aking dokumentaryo (tentative)
• Camera stills at the narrator	Ang mga teknolohiyang ito ay madalas nakalaan para sa mga pangunahin at pangkaraniwang mamimili. Mamimili na walang kapansanan at malayang gamitin ang mga ito sa iba't ibang paraan. Kaya naman kadalasan, nahihirapan ang mga taong may kapansanan sa paggamit ng mga ito. Sa kabutihang-palad, may mga teknolohiyang sadyang ginawa para sa mga tulad nila upang mapagbuti at makatulong sa paggamit nila rito. Ito ay tinatawag na "Assistive Technologies" sa Ingles. Subalit, ang mga teknolohiyang ito ay tila napagiwanan sa bilis ng pag-unlad ng ICTs.
• Narrator Talking - walking towards Grain Foundation building.	Mabuti na lamang ay may mga organisasyon na tumutulong sa mga tulad nilang tila nababaliwala ng lipunan. Isa na lamang rito ang Grain Foundation for People with Disabilities Incorporated. Halika at pasukin natin ang mundo nila.

Visual	Narration / Script
• Camera perspective - walking towards the interviewee	(Greetings)
• Camera perspective - Focuses at Ms. Pearl Soriano	(Ms. Pearl Soriano explains Joy's disability)
• Camera perspective- person with camera steadily looks at the participant	(Ask basic information : Let her tell her story of taking IT and applying for work) (Starts interview) (Closing Remarks)
• Flash few scenes of going to Philippine National School for the Blind or Atriev(Tentative)	
• Camera perspective - walking towards the room for the next interviewee	(Greetings) (Ask basic information) (Starts interview) (Closing Remarks)
• Camera focuses on the Narrator (Inserting random filler scenes of PWDs)	(Concluding Statements) (Batas para sa PWD)
• Camera perspective of person with physical disability (tentative) transition to people with dyslexia (tentative [location - roads]) transition to people with partial blindness to total blindness transition to hard of hearing to total deafness {Trigger warning if needed}	(Let the viewers feel as if they have their own disability)
• Camera focuses on the narrator stating his final	(Final words and/or message)

Figure 3. Script outline snippet used as a guide during production.

Equipment preparation. The researcher needed various equipment in shooting VR video such as monopod, memory cards, ambient microphone, 360° camera, monopod stand, lapel microphones, camera headgear, and VR headgear.

Photograph 1. Various equipment needed for production

The researcher used Xiaomi Mi Sphere which is a type of 360° 2D camera. A Telesin monopod with a length of 106 inches or 270 cm. A long monopod is needed to achieve the standard target eye level for a more immersive experience of the viewer. Furthermore, a 64 GB of micro SD card was used to compensate for the large file sizes of VR videos. In addition, 2 Boya lapel microphones was used for a clearer audio of the conversation while Zoom H1 microphone was used in capturing ambient sound. Also, a Do-It-Yourself (DIY) camera headgear was made because there is no available headgear for 360° cameras in the market. Finally, a monopod stand was also used for a stable and static shots.

Production

Video shoot was held at Grain Foundation for PWD Incorporated specifically, at their enterprises namely, Dunamai Canteen, Dunamai Salon, and Dunamai Café. On a scheduled date, the production lasted for 2 days.

Post-production

Video footages are stitched, filtered, and edited into one documentary video. The estimated duration of the video is 25 to 30 minutes. Editing software were used such as the Xiaomi Mijia desktop application and Adobe Premiere CC while a computer with high specification was needed to edit 360° videos.

Difficulties Encountered

Virtual Reality is a new venture for the researcher. The researcher needed to have enough knowledge on how to shoot and what to consider in shooting VR videos. Thus, the researcher took crash courses and did his own research on this matter. The things he learned in shooting traditional films was not applicable to VR productions since it is a 360° video, for instance, compositions will not totally matter. In addition, VR equipment is still a new wave of technology especially here in the Philippines, as a result, the researcher faced financial difficulties in acquiring the needed equipment in materializing the VR documentary.

Data Analysis

The transcripts of the whole interviews were made and thoroughly reviewed. Data gathered were analyzed through coding wherein relevant sentences, phrases, and/or statements said by the participants were noted. Relevant statements were categorized based on their connection to each other. A flow chart was made to illustrate the connection of the categories. This process made data gathered easier to conclude.

Dissemination

The produced documentary can be distributed to multiple ways, one is by using Open Flatforms wherein its contents are accessible enough while it is free and easy to use. Examples are Youtube, Facebook, Go Pro, and the like. Meanwhile, the researcher will coordinate to Grain Foundation for PWD Incorporated, posting the documentary video on their Youtube accounts and other websites or webpages. Another way of disseminating the video is through White Label Applications wherein 360° videos are posted to standalone applications and compatible to any VR headset for a more accessible viewing.

Chapter Four

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

Convenience of ICT to PWD
Through internet, hindi ka man maka-attend sa mga seminar, nagkakaroon ng mga support groups kaya hindi ka male-left behind. [1] *Nanunuod sa Youtube at Facebook.* [2] *Nakikipagusap sa ibang tao.* [3] *Nagiging aware sa pangyayari sa bansa at sa ibang bansa pati sa usap-usapan ngayon mapa -problema, politics o mga sakit man.* [4] *Kagaya si jasper hindi matutukan sa pagsasalita kung gusto niya matuto, through internet search lang siya at kagaya sa mga research sa assignments.*[5]
Discrimination
Nag-apply as encoder, hindi po sila tumatanggap ng may disability kasi hindi ko raw kaya yung mga ipapagawa nila. [6] *Nasasaktan po pero hindi ko po sinasabi sa magulang ko kasi part po ng buhay ko yun na kailangan kong labanan yung mga ganun kahit sa sarili ko lang.* [7] *Sana bigyan nila ng chance ung mga PWD tapos yung mga ginagawa nilang mga website at application hindi lang para sa normal ng tao kasi hindi lang normal ang nasa mundo.* [8] *Kahit na mahirap basta po may inspiration ka gaya ng pamilya at kaibigan ka mahaharap mo yun kahit may disability ka.* [9] *Huwag tayong maglimita sa iisang side lang, check rin natin yung needs ng iba kasi kahit may disability sila, mas marami pa silang maitutulong sa pag-unlad na hindi natin alam.* [10]
ICT Awareness
May mga taong hindi aware sa ability ng PWD halimbawa may mga pwd na nagiging barista hindi alam ng tao un. [11] *Maiinform lahat ng tao na may mga abilities ang mga PWD na kaya nilang gawin ang mga bagay na kayang gawin ng isang normal na tao.* [12] *Maganda pag nalaman ng iba lalo na sa mga web developers, baka maisipan nilang dagdagan pa ung application nila para sa PWD.* [13]

Struggles of PWD
Hindi gumagamit ng mga Microsoft kasi hindi ganun karami ung kaalaman ko pagdating sa ganun. Kung mabibigyan ng pagkakataon na aralin gugustuhin ko. [14]
Akala ng ibang tao hindi ako PWD tapos ung ibang tao ay hindi aware sa mga PWD. [15]

Table 1. Transcript of the relevant responses of the participants in the interview.

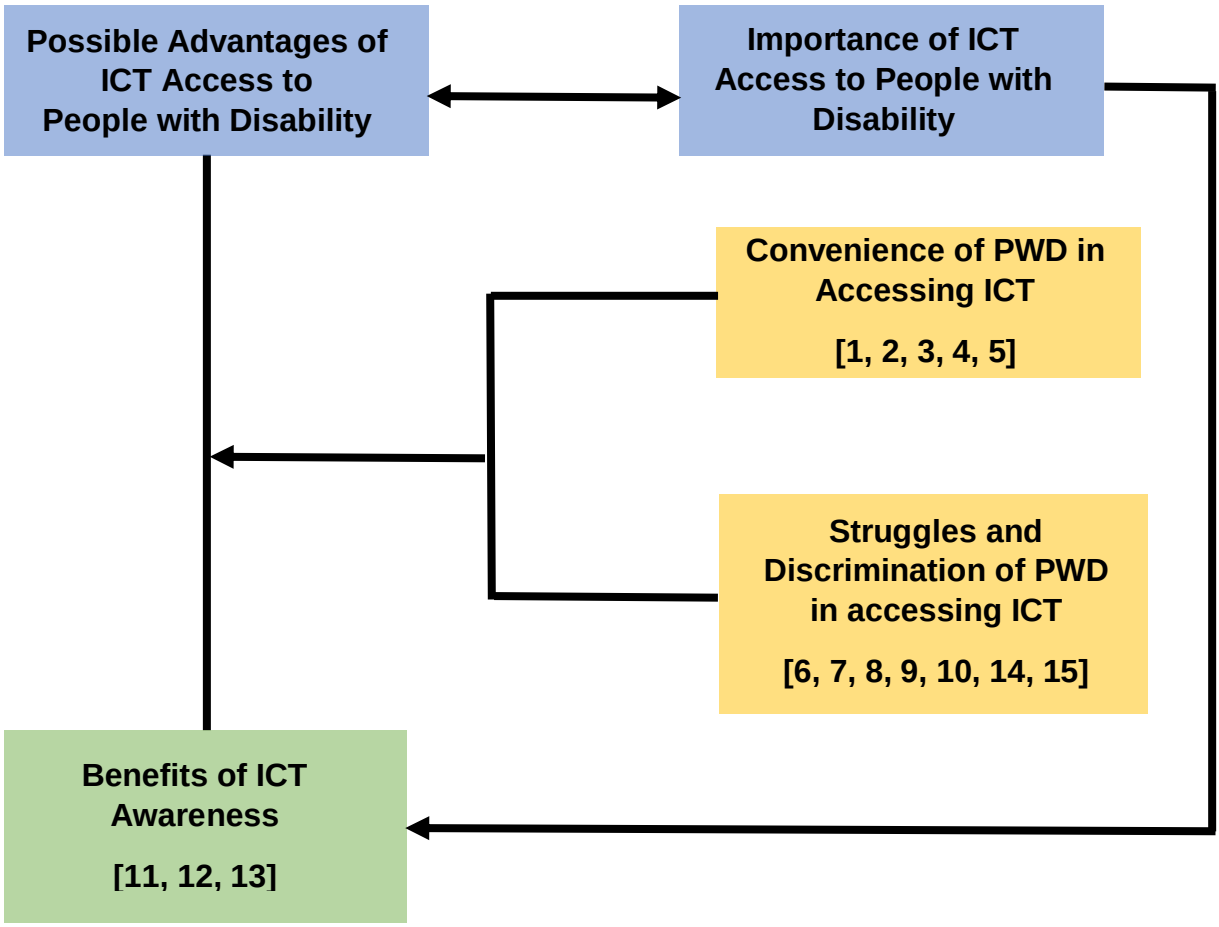

Figure 4. Flowchart used for an easier evaluation of interview responses.

Results and analysis

The study shows that ICT can empower PWDs as an active member of society as it opens social, cultural, educational, and economic opportunities for them. On the other hand, education, digital literacy, and access to assistive technologies (AT) of PWD play a pivotal role in accomplishing said opportunities. Individuals with serious sensory disabilities such as physical disabilities, visual impairments or deafness have benefited more than any other group of individuals from advancements in assistive technologies. Technological advancements specifically made to assist these disabled individuals can lead to increased productivity, employment and recreation opportunities (Eid, n.d.).

ICT helped PWDs in their educational experience by utilizing certain approaches such as distance e-learning to allow students with disabilities continue to stay at home while studying through the use of computers, reading digital and audio libraries to allow students access educational courses, and internet or broadbands to be used as their source of getting public information such as news or other leisure interest. The following examples are some of those mentioned by the participants:

> *Through internet, hindi ka man maka-attend ng seminar, nagkakaroon ng mga support groups kaya hindi ka ma le-left behind.*
>
> *Nagiging aware sa pangyayari sa bansa at sa ibang bansa pati sa usap-usapan ngayon mapa-problema, politics, o mga sakit man.*
>
> *Kagaya si Jasper, hindi matutukan sa pagsasalita, kung gusto niya matuto, through internet search lang siya at kagaya sa mga research sa mga assignments, natututo na siya.*

The participants emphasized that awareness in what is happening around them is important. This shows that PWD can operate basic features of ICT such as browsing, searching, and accessing social networking sites.

Furthermore, ICT also make PWDs' daily lives more convenient as it lets them experience a sense of control over their day-to-day activities and enjoy independence. ICTs, combined with proper adoption methods, can offer individuals the ability to compensate for their physical or functional limitations, therefore allowing them to enhance their social and economic integration in communities by broadening the range of activities they can perform (Shuja, 2008). Visually impaired for instance, may use mobile applications to help them navigate when travelling. Moreover, there is no doubt that even communication in the lives of PWDs are eased through the help of ICT. Using audio-visual related assistance technologies, PWDs who have learning difficulties have the option to use and rely on ICT to communicate with others, especially using social media such as WhatsApp and Facebook which have become an integral part of daily life (Osman and Diah, 2017). In addition, hearing-impaired use ICT to search for unfamiliar words due to their limited vocabulary. This helps them

better understand the person they are talking with, especially in cases that the ones they are communicating with aren't hearing-impaired.
It also enriches PWDs' social relationships. To demonstrate, the researcher observed that people who are hearing-impaired use video calls in mobile devices while using sign language to communicate.

The paper also reveals that there are existing opportunities for PWDs in the field of ICT. Online freelance work is one such ICT innovation that skilled PWDs can use to earn income and become financially independent. It is also consistent with the Philippines reputation of being one of the leading destinations for information and communications technology business process outsourcing (DICT, 2014). On the other hand, this kind of opportunity is only applicable to PWDs who have undergone training to acquire such skills. The training is not free and could be inaccessible especially to PWDs living in developing countries, as one participant mentioned:

> *Hindi ako gumagamit ng mga Microsoft kasi hindi ganun karami ung kaalaman ko pagdating sa ganun. Kung mabibigyan ng pagkakataon na aralin gugustuhin ko.*

In addition to this, he also pointed out that mobile devices were made versatile enough, therefore did not need to learn and use other devices. While it is true that ICT can pave the way for opportunities for PWD, there are still barriers need to be overcome for this to happen, with lack of interest, lack of awareness, difficulty of access, high cost of ICT and AT, lack of training, and lack of on-going support being some of those primarily mentioned by the participants.

Some participants who had a history of studying Information Technology (IT) however, didn't have any opportunities open for them. One participant who studied IT had to stop on her third year in college because she experienced bullying. Afterwards, she then applied for IT work. She said:

> *Nag-apply ako as encoder, hindi po sila tumatanggap ng may disability kasi hindi ko raw kaya yung mga ipapagawa nila.*

The researcher assumes this event to be an example of discrimination of PWD in the workplace. On the other hand, the researcher failed to gather data from the employers regarding their criteria in accepting employees with disabilities. This could have led to a better understanding on the status of the PWDs' employability. Moreover, the aforementioned past experience made the participant switch career as she was discouraged with working in the field of ICT. Working in the ICT field does not require one to have a high degree of education, but rather that the applicant be knowledgeable in the use of ICT in order to serve as stepping stone towards his/her career in the said field. The primary skills required for one to enter the ICT industry are the following: Basic knowledge in using the computer in the area of data processing in terms of input, organization, storage and output as well as dealing with the Internet as a source of information (Osman and Diah, 2017). Thus, the participant should had been competent enough in acquiring the job since she had IT related background. In addition, more technologies are made for major consumers which symbolizes discrimination because PWD are often disregarded in the production of modern

technologies. Technologists, providers of IT solutions and services, and design manufacturers need to interact with PWDs to understand their needs firsthand, and to co-design indigenous hardware and software solutions to better address them (UNESCO, 2014). As another respondent stated:

> *Sana bigyan nila ng chance ung mga PWD tapos yung mga ginagawa nilang mga website at application hindi lang para sa normal ng tao kasi hindi lang normal ang nasa mundo.*

> *Huwag tayong maglimita sa iisang side lang, check rin natin yung needs ng iba kasi kahit may disability sila, mas marami pa silang maitutulong sa pag-unlad na hindi natin alam.*

ICT has a crucial role in the empowerment of PWDs to obtain the right to independent living like the non-disabled. However, empowerment may come from advanced education and costly training of skills that can be inaccessible for PWD in developing countries. Community respect for PWDs depends on the level of their participation in community activities (Osman and Diah, 2017). Educational attainment, work, and community participation play important roles in this regard. Thus, skilled PWD are more respected than those who are still on the process of developing skills or those without a good educational background. On the other hand, despite PWDs often being looked down on and pitied at, their self-valuation does not get affected and they continue to pursue their goals and ambitions. Some examples respondents mentioned are as follows:

> *Hindi ko nalang iniintindi iyong mga nangbu-bully sa akin. Hindi ko nalang pinapansin iyong hindi nakakaintindi sa kalagayan ko. Basta focus lang ako sa trabaho at saka sa mga kailangan kong gawin.*

> *Nasasaktan po (Bullying) pero hindi ko po sinasabi sa magulang ko kasi part po ng buhay ko yun na kailangan kong labanan yung mga ganun kahit sa sarili ko lang.*

> *Kahit na mahirap basta po may inspiration ka gaya ng pamilya at may kaibigan ka mahaharap mo yun kahit may disability ka.*

Support groups such as non-government organizations (NGOs) were a great help to PWDs in overcoming personal circumstances and improving their social relations. They found a sense of peace and belonging with these communities because they felt respected, supported, and felt that they have their own value and importance. They often considered these groups and the people within them as a family. The community gave them inspiration, support, motivation, and self-worth to be able to face the outside world where they are often vulnerable to bullying, and discrimination.

Discussion

ICT plays an important role for the empowerment of PWDs by opening opportunities for them. On the other hand, there are multiple barriers that hinder them from experiencing the full benefits of ICTs. First is their lack of interest towards the opportunities that are possibly available for them in the field of ICT. Second is the lack of awareness regarding the benefits of the accessible technology that may offer support and services for them. Third is the lack of access to the technology itself. Fourth is the high-priced technology that is inaccessible for the majority of the PWD since most of them belong to low and middle-class backgrounds. Fifth is the lack of training because some technologies require basic or specialized training for it to be usable. Otherwise, the technology might further harm the person due to improper procedures. Finally, lack of on-going support in terms of technological breakdown. Support enables PWD to solve their immediate and on-going problems, as well as make the best use of the technology they have (Shuja, 2008).

There is a world-wide effort to achieve the Sustainable Development Goals (SDGs) for PWDs such as addressing issues in education, growth and employment, inequality, and accessibility. Here are the SDGs related in this regard: Inclusion and equitable quality education and life-long opportunities, and ensuring equal access to all levels of education and vocational trainings; promotion of full and productive employment and decent work; provision of safe, affordable, accessible, and sustainable transport systems; and promotion of social, cultural, and political inclusion of PWDs (UN, 2018). In general, SDG promotes PWDs' total inclusion in the society by addressing disability issues. However, SDG for PWDs is still far from materializing because disability divide is still a major contributor in the widening gap of the digital divide. PWDs' access to ICT and AT are greatly influenced by social and economic factors. The adoption and use of accessible ICT for inclusion is dependent on many actors in the ecosystem including government service providers, educators, employers, development practitioners, and the ICT industry (Raja, 2016). Therefore, disability divide can be considered a socio-economic issue. Socioeconomic status (SES) can encompass quality of life attributes as well as the opportunities and privileges afforded to people within society (APA, n.d.). It includes an assessment of the individual or group's educational attainment, financial security, and subjective perceptions of social status and social class. PWD remains to be the most vulnerable to poverty due to unemployment, discrimination, lack of accessibility, and inequality. As a result, the large number of PWDs experiencing poverty negatively affect the country's economic status. As UN Secretary-General Antonio Gutteres said, "Societies will never achieve SDGs without the full participation of everyone, including people with disabilities. We cannot afford to ignore or marginalize the contribution of 1.5 billion people" (UN, 2018).

In the Philippines, the government has made efforts towards the empowerment of PWD by passing several laws that will support, protect, and make their lives more convenient such as Republic Act No. 7277, which outlines the rights and privilege and prohibits discrimination towards them, accessibility law ensuring express lanes and access to medicines and other purchases through discounts, and Republic Act. 10524

which ensures an equal employment opportunity between the disabled and non-disabled (NCDA, n.d.). However, despite these efforts, PWDs continue to experience discrimination especially in the workplace and the country is still far from becoming PWD-inclusive. In the Philippines, the proportion of employed PWDs in the urban area is slightly higher (58.3%) than that in the rural area (41.9%). More than half of those with jobs or businesses were still looking for additional work to be able to augment their income (Mina, 2013). In addition, being a member of an NGO for PWD has a higher rate of employment especially in urban area while educational attainment is still a crucial criterion for PWD in applying for work as it will increase their credibility and decrease their vulnerability to discrimination.

Some ICTs were used as a platform for certain assistive technologies. As a result, access to them were more convenient in terms of availability such as mobile applications. For example, the Sesame Phone which is designed for PWD that has limited mobility allows them to operate the device through small head movements and voice-control that provide a hands-free experience; and Talkitt which is an innovative application that is designed for people with speech impediment. It is able to translate unintelligible pronunciation into understandable speech (Agus, 2016). While these technologies certainly offer a more convenient experience, they tend to be inaccessible, especially in developing countries due to its expensive price. Sesame Phone is worth $1,095 for lifetime usage or you can pay $19.99 a month while the Talkitt application is worth $87,035 for a lifetime license which is worth more than four million in Philippine peso. Knowing that the Philippines is a third world country, this device is almost unachievable. In addition, over 80% of PWDs live in isolated rural areas in developing countries. It also indicates that unemployment rate among PWDs in developing countries amount to 90% and in developed countries up to 70% (UNESCO, 2011). Thus, this shows that there are merely less than 20% of PWDs around the world who have access to innovative assistive technologies. Moreover, AT were mainly produced in developed countries while ATs available in developing countries mostly came from donations and charitable services if not non-existent. However, these often focus on the provision of substandard or used products they are often not appropriate for the user or the context as they are not maintainable, repairable or replaceable locally, and can lead to secondary health complications (Rohwerder, 2018). Participant with hearing-impairment on this study are aware of an AT that can greatly help their way of communication to people who cannot communicate through sign language wherein the words of the person they are talking to are recorded then translated into a video of the sign language of said words. They stated that the technology is not yet existing in the Philippines but available at Europe. This further proves that innovative AT are commonly produced and accessible to developed countries.

The study shows that access to ICT is important as it can pave the way for the inclusion of PWDs in the modern society through opening significant opportunities for them. Education and acquisition of ICT skills are vital for them to be competent enough on the labor market. On the other hand, a deeper understanding of the criterion of employers in accepting employees with disabilities will lead to a better understanding of PWDs employability. Why are PWDs often denied job opportunities? Are they being discriminated by their potential employers or are they truly incapable of doing the workload? Furthermore, the cost of training and education should be accessible and

affordable because most PWDs belong to developing countries. PWDs who can acquire a job relatively have a higher rate of living a dignified life when compared to unskilled PWDs, who are most vulnerable to discrimination and bullying. Thus, their self-esteem is affected negatively as they can feel less important in the society. On the other hand, NGOs for PWD help them overcome such circumstances and offer trainings to develop certain skills that they can use to acquire a job. However, this means that the organization will be the one shouldering the problem of the PWD in terms of employment. Grain Foundation for PWD Inc., the organization who coordinated in this study, formerly offered the course Information Technology to PWDs; however, the organization itself found a hard time in getting PWDs a job in this line of work so they decided to replace this with a program connected with hotel and restaurant management. Despite of these efforts, they still found themselves failing in getting the PWDs a job in the competitive labor market. Thus, they decided to fund and establish their own social enterprises namely Dunamai canteen, Dunamai salon, and Dunamai café. This further proves that PWDs employability is struggling in the Philippines' labor market despite of the laws that were dedicated for the equality of job opportunities. In addition, there are instances where companies and employers will need to provide an extra mile of effort when accepting employees with disabilities. The coordinator of the Grain Foundation stated that some companies will not accept employees who are hearing-impaired because they will not bother on hiring a sign language interpreter just for a particular employee. While it is true that hiring an interpreter can be an additional cost for the employer, hiring one could have paved the way for opportunities for hearing-impaired and make his/her company a PWD-friendly workplace. The researcher believes that employers and people who are capable of giving opportunities to others should contribute to achieve the SDGs for PWDs and give an extra mile of effort for them because they need special treatment due to their disability.

Awareness is the key for a more accessible environment for PWD. Through the study, PWDs will be more knowledgeable about the possible benefits ICT can offer them as well as the barriers that prohibit them in experiencing it. People without disabilities on the other hand, will be reminded of the discrimination PWDs are currently experiencing not only in the workplace but also in various aspects of the society and that there are existing laws that prohibits inequality among disabled and non-disabled. Such laws shall be strictly implemented because it is important to ensure the safety of PWDs in working and non-working environment. Furthermore, technologists, innovators, and other producers shall consider PWDs in designing the devices they are creating which promotes equality and involvement of PWD in the society. They need to connect and interact with PWD for them to further understand their needs and apply the necessary adaptation and assistance PWDs needed in modern technologies.

Chapter Five

CONCLUSION AND FUTURE WORKS

Access to ICT plays a pivotal role in empowering PWDs in the society through opening social, cultural, educational, and economic opportunities. Students with disabilities' educational experience was greatly improved through the help of ICT by utilizing the use of distance e-learning, reading digital and audio libraries, and internet or broadband. It provides a sense of control and independence in the daily lives of PWDs by providing assistance such as usage of mobile applications as a guide when travelling for visually impaired, and more convenient communication such as searching of unfamiliar words of hearing-impaired due to their limited vocabulary. It also enriched PWDs' social relationships using social networking sites such as WhatsApp and Facebook. Acquisition of ICT skills through education and training is also essential for them to be competent in the labor market. However, there are inter-related barriers that hinder them from experiencing the potential benefits of ICT, namely: lack of interest, lack of awareness, difficulty of access, high cost of ICT and AT, lack of training, and lack of on-going support. In addition, PWDs are often discriminated in the workplace, despite having IT-related background. ICT accessibility is important because it can pave the way for the total inclusion of PWDs and living a dignified and integrated life in society. Furthermore, technologist must consider PWDs in designing the devices before releasing to the market as it promotes equality and inclusion. Awareness is the key for a more accessible environment for PWD.

Should further studies be pursued, a deeper study on the employability of PWD should be analyzed and studied. This includes the side of the employers regarding their criterion in accepting employees with disabilities. The researcher recommends future studies to focus on one disability for a more centered research regarding the type of disability which may include the disability's weaknesses to be addressed in the study and find possible solutions to compensate it. In addition, a study regarding PWDs' digital or media literacy should also be examined as it is one of their major problems especially in developing countries such as the Philippines. Finally, a study promoting knowledge societies can be considered because it includes the promotion of media literacy, accessible ATs, eradication of discrimination, and advocacy of PWDs rights and needs.

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ANNEXES

A. Table 2. Interview Protocol

Background Information	Research Question 1	Research Question 2	
	What is the importance of ICT access to PWD?	What are the advantages or potential benefits ICT access presents to PWD?	How can we raise awareness about PWD being hindered in accessing ICT?
Interview Questions	**Interview Questions**	**Interview Questions**	**Interview Questions**
• Basic information to ask: Name and Age • What is your disability? • What is your work? • What do you usually do in your work?	• As a PWD, how do you use ICT in your daily life? • Have you ever struggled using ICT? In what ways? How did you feel during those incidents? • How often do you: ○ Use your mobile phone? ○ Use a computer? ○ Surf the internet? • For what purposes do you use your mobile phone? • What do you usually do when surfing in the internet? • What do you think of the developments of technology for PWD that have happened gradually over the years?	• Do you think access to ICT benefits PWD? How? • Does access to ICT help you in any way? How? • As a fellow PWD, what do you think can be done to improve PWD access to ICT?	The last decade has seen an online revolution. Trending tweets or Facebook post that increase public awareness for social issues such as ALS, Alzheimer's Disease, and Pride Community or LGBTQ, among others. Some have also used films and TV shows (e.g. Koe no Katachi, Theory of Everything, Me Before You, etc.) to do these. • What are your thoughts on these? • Do you think they achieved their goals? • What are your thoughts on using similar methods (social media, films, TV series, video features/discussion, etc.) to increase public's awareness about PWD's ICT access?

B. Consent Letter for Grain Foundation for PWD Inc.

Faculty of Information and Communication Studies
UNIVERSITY OF THE PHILIPPINES
OPEN UNIVERSITY

Los Banos, Laguna 4031
(6349) 536 6001 to 6006 loc. 334-841

Date

MS. PEARL ANGELA L. SORIANO
Coordinator
Grain Foundation
261 1122, Lourdes Castillo
Quezon City, Metro Manila

SUBJECT: Permission to Conduct Research Study

Dear Ms. Soriano,

I am James Harvey Maceda, a 4th year Bachelor of Arts in Multimedia Studies (BAMS) student of the University of the Philippines - Open University (UPOU). I am currently working on my undergraduate thesis entitled *Exploring ICT Awareness and Access Among People with Disabilities*. With this in mind, I would like to request permission to conduct the study in your foundation.

With your permission, I would like to film interviews with 3 - 4 persons with disabilities (PWDs) between the ages of 16 and 25, regardless of gender. The consent of interested participants will be gained through a letter addressed to them, as well as their parents.

Once participation has been confirmed, participants will be interviewed on a scheduled date, of which they will be informed ahead of time. A questionnaire designed to collect the necessary information for the study will also be given in advance. The interview process should take no longer than 3 hours. The interview results will be packaged into a video documentary that will be disseminated publicly. No costs will be incurred by either the Grain Foundation or the individual participants.

If you permit my study to be conducted the Grain Foundation, kindly affix your signature below. Your approval will be greatly appreciated. Should you have any questions or concerns, you may contact me at jamesharvey.maceda@upou.edu.ph.

Sincerely,

James Harvey Maceda
University of the Philippines: Open University

Approved by:

Name and Title	Signature	Date

Los Baños, Laguna 4031 Philippines
Tel : +63(49) 536 6001 to 6006 loc. 334 & 841 Fax: +63(49) 536-6009 Email: fics@upou.edu.ph

C. Consent Letter for Participants

Faculty of Information and Communication Studies
UNIVERSITY OF THE PHILIPPINES
OPEN UNIVERSITY

Los Banos, Laguna 4031
(6349) 536 6001 to 6006 loc. 334-841

Dear Participant,

I am James Harvey Maceda, a 4th year Bachelor of Arts in Multimedia Studies (BAMS) student of the University of the Philippines - Open University (UPOU). I am currently working on my undergraduate thesis entitled *Exploring ICT Awareness and Access Among People with Disabilities*. The study aims to:

1. Discuss the importance of ICT access to people with disabilities;
2. Identify the possible advantages or how ICT access can help people with disabilities; and
3. Raise awareness about people with disabilities being hindered in accessing ICT and other multimedia products.

I would like to ask for your participation through an interview which will be filmed and disseminated as part of a video documentary. A questionnaire designed to collect the necessary information for the study will be given ahead of time. The output of this study will be open publicly and as such, has the risk of exposing your personal life to some extent. Your participation is voluntary. You may decline to answer any question, refuse to take part altogether, or withdraw from the study at anytime.

If you agree to participate in this project, kindly affix your signature below. The interview process will take 1 to 2 days. The schedule will depend on the availability of the people involved and you will be informed ahead of time to help prepare yourself for the interview.

Should have any question about this project, do not hesitate to contact me at or send an email at jamesharvey.maceda@upou.edu.ph. Information on the rights of human subjects is available at http://tcps2core.ca/welcome.

Thank you for your assistance in this important endeavor.

Sincerely,

James Harvey Maceda
University of the Philippines: Open University

Signature over Printed Name

Parent's Signature

Los Baños, Laguna 4031 Philippines
Tel : +63(49) 536 6001 to 6006 loc. 334 & 841 Fax: +63(49) 536-6009 Email: fics@upou.edu.ph