An Investigation into the Success of the National Library Board's Digital Literacy Programmes and Initiatives in Addressing the Diverse Needs of Singapore's Senior Demographic

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Abstract

The Singapore National Library Board (NLB) has made a commitment to support the digital inclusion of adults aged 50 and older with digital literacy programmes and initiatives for seniors, a broad demographic with a variety of needs, interests and abilities. The multiple-methodological research approach used explored the NLB's digital literacy programmes and initiative partnerships, their content and delivery, best practice (as found in literature), as well as benefits and challenges, and determined how well they meet the diverse needs of Singapore's senior demographic.

Research found that the NLB is fully committed to supporting the digital development of seniors. Qualitative data showed that a majority of programmes are for seniors in employment, most programmes require existing digital proficiencies, and nearly all are conducted in English. Findings revealed an extensive network of partnerships supporting programmes. Observations uncovered teaching methods and best practice. Facilitator and participant interviews revealed that the programmes' curriculums align with the Singapore government's digital literacy objectives for seniors, and programmes are highly valued because they occupy time, engage the mind, teach digital skills for self-reliance, and develop strong social networks. However, there needs to be more differentiation for ability, beginner programmes, practical hands-on sessions and ongoing informal support beyond formal learning, as well as improvements to increase promotion and simplify booking systems, and better utilisation of experienced senior digital volunteers.

The limitations of this research were the small sample size of interviewees and the number of observations, as well as the lack of access to NLB leadership for information on the key objectives of the programmes and initiatives, participant attendance and demographic statistics. This study provides preliminary insights, but to gain a more accurate understanding of the success of the of the NLB's digital literacy programmes and initiatives in addressing the diverse needs of Singapore's senior demographic, further research involving more observations, a more comprehensive sample of interviewees and the full support of the NLB to provide their perspectives and complete data is required to ensure more precise results.

Keywords

digital literacy, digital skills, senior demographic, older adults, National Library Board Singapore, digital literacy programmes and initiatives

1. Introduction

Digital technologies permeate the lives of citizens in Singapore. Smartphone apps and websites are widely used for communication, entertainment, shopping, banking, transport and government services, including access to healthcare, tax services and pensions. Although there has been a rise in the number of senior Singaporeans using the internet and a recent study conducted on Singaporeans aged 57 to 76 found that 92.3% owned smartphones, 43.11% possessed computers and 34.12% had tablets, Singaporean seniors "remain outpaced by younger generations in terms of digital ownership, usage, and literacy" (Centre for Research on Successful Aging 2023).

Digital competences have become increasingly essential for all citizens to be fully included in society and, as non-digital natives, older people are at risk of digital exclusion (Schirmer et al. 2022). Additionally, research has found that digital literacy programmes positively affect the well-being of seniors and afford them meaningful opportunities to stay socially connected and cognitively engaged (Centre for Research on Successful Aging 2023).

The population in Singapore is aging rapidly. By 2030 a quarter of the population will be over 65, rising to almost half by 2050 (Bloomfield 2019) and the Singapore government has recognised the need to support the digital literacy of seniors, stating that Singaporeans must "obtain the necessary tools and skills for a digital future" (Ministerial Committee on Ageing 2023).

The Ministry of Digital Development and Information works with the National Library Board (NLB) to cover five competencies in their 'Digital Skills for Life' framework, which "aims to equip all Singaporeans with essential digital knowledge and skills to conduct daily online tasks, navigate the digital space and safeguard against digital risks" (Ministry of Digital Development and Information 2024).

Singapore's 26 public libraries, run by the NLB, are well positioned to offer specialised programmes to support the needs of the senior population. The blueprint for Singapore libraries, LAB 25 (National Library Board Singapore 2021) outlines strategies to address digital literacy knowledge deficiencies within the senior community through their 'Equaliser' initiative, which aims to empower, bridge societal gaps and enable seniors to acquire digital skills.

The NLB digital literacy programmes for seniors are open to adults aged 50 upwards, and this multi-generational demographic contains adults with different socioeconomic backgrounds, languages, cultures, employment status', interests and values (Sabo 2017). Addressing the requirements of such a diverse group is challenging and this research investigates how well the NLB's digital literacy programmes cater to the broad senior demographic and their varied needs.

Studies elsewhere have investigated best practices in collaboration, planning and implementation for digital literacy programmes for seniors, and this research will examine the NLB's current practices in these areas, to identify positive practices, as well as areas for improvement. Overall, research findings will provide an insight into successes and deficiencies in the NLB's digital literacy programmes and initiatives for seniors.

2. Aim and Objectives

2.1 Aim

The aim of this research is to explore how successful the National Library Board's digital literacy programmes and initiatives are in meeting the diverse needs of the senior demographic in Singapore.

2.2 Objectives

The objectives of this research are to:

1) Examine the aims and objectives of the NLB's digital literacy programmes for seniors and establish how programme decisions are made, and how they are promoted.

2) Investigate the digital literacy for seniors' programme partnerships with government agencies, community groups and volunteers, and establish what benefits they provide.

3) Evaluate programme practices based on observation and analyse participants' interviews to identify best practices, as found in research.

3. Literature Review

3.1 Introduction

The preliminary review of literature on the provision of public library support and services for the digital literacy needs of seniors, found that there is a lack of research specifically on the provision and effectiveness of digital literacy programmes in Singapore libraries. However, extant literature on libraries' support of older adult digital literacy globally, and the specific needs, knowledge acquisition and learning preferences of seniors, highlight findings in five key themes that are relevant to this research: diversity in the senior demographic, partnerships with libraries to deliver digital literacy programmes, the connection between digital literacy skills and wellbeing, barriers and enabling factors to learning and best practices in digital literacy programmes.

3.2 Seniors – A Diverse Demographic

Horton (2019) states that public libraries must continuously examine their perceptions of senior clients who, in previous years, had been viewed as a collective group with similar needs. However, when considering service requirements and interests, it is essential to understand that "older people form a very heterogeneous group who may not share anything with each other beside their age" (Schirmer et al. 2022 p. 4) and it cannot be assumed that the senior demographic has shared views, presuppositions and knowledge about digital technology (Quan-Haase et al. 2018).

Sabo (2017) further explains that seniors' diverse needs include employment status, socioeconomic levels, values and interests. Additional distinct and varied needs can include cultural and linguistic diversity (American Library Association 2017), significant differences in activeness which can affect participation in programmes (Horton 2019) and a wide range of familiarity and competencies with technology (Bennett-Kapusniak 2013). Quan-Haase et al. (2018) argue that seniors can be classified into five distinct groups, contingent upon on their proficiency in digital skills, their use of technology and their digital use requirements and interests.

Guidelines state that adults' interests and requirements change as they age and libraries should cater for the demographic by "encouraging diversity, variety and flexibility in planning collections, programmes, and services" (American Library Association 2017). Libraries can provide information and offer life-long

learning to serve this diverse demographic (Meyer 2015), with programmes to include upskilling for the workplace, digital literacy and the fulfilment of personal interests (Sabo 2017).

All literature reviewed concerns adults globally from retirement age (usually around 65 years old) and beyond. However, the NLB's digital literacy programmes and initiatives for seniors are open to adults aged 50 upwards, so research must consider the needs of a much wider demographic, with a multi-generational span, who will potentially have a greater range of interests and a portion of whom are more likely to have digital literacy needs for the workplace.

3.3 Library partnerships

Library partnerships with community organisations to provide services for seniors, including digital literacy programmes, are advantageous as they "develop sustainable strategic partnerships which result in community impact" (American Library Association 2018). Public libraries can serve as centres of knowledge and community connections. They have the potential to create opportunities and address challenges within the older population, through teaching skills, bridging social gaps and developing social networks (Wynia Baluk, Griffin and Gillett 2021).

Suchowerska and McCosker (2022) state that government initiatives to strengthen seniors' digital literacy benefit from partnerships with local groups and organisations, which have the capacity to better understand seniors' needs, motivations, and barriers to engagement with technology. To ensure successful implementation of programmes and help facilitators determine gaps, and set appropriate goals for support, community partners can include seniors in the planning stage of programme development (Sen, Prybutok and Prybutok 2022).

Collaboration and co-creation of programmes can combine pedagogical practices with the requirements and interests of communities. As a result, participant engagement is sustained, learning is more successful, and participants' digital participation is instilled in everyday practice (Suchowerska and McCosker 2022). Libraries must therefore be proactive to identify, connect with and establish relationships with organisations that can share support of their missions (American Library Association 2018).

With this evidence in mind, research into the NLB's digital literacy programmes for seniors should examine their collaboration with government agencies, community organisations and seniors, to develop and deliver initiatives for digital inclusion. There should be a focus on the benefits that these collaborations provide for the development and delivery of programmes.

3.4 Digital Literacy and Wellbeing

The use of digital technology is widespread in today's society. Public and commercial services, social engagement and civic participation have increasingly adopted digital formats, and sometimes digital formats are the only means to access or easily access services, with no alternatives (Betts, Hill and Gardner 2015), which forces seniors to incorporate digital technologies into their daily routines (Vercruyssen et al. 2023). Digital competency supports seniors' independence and reinforces personal autonomy (Kebede et al. 2022), whereas seniors who lack competency in digital literacy skills risk being digitally excluded from society (Barbosa-Neves and Mead 2021).

There are numerous benefits to seniors' engagement with digital technology. Gardner, Kamber and Netherland (2012) claim there is a correlation between social isolation and poor health. Access to and the

ability to use digital technology can alleviate the social and spatial obstacles to social engagement experienced by seniors (Sen, Prybutok and Prybutok 2022) and Internet use enables seniors to be socially connected, which reduces loneliness and depression (Visaria, Aithal and Malhotra 2023). The World Health Organization has called for policy makers to ensure that digital literacy programme provisions for seniors specifically aim to reduce social isolation and loneliness in the senior demographic (World Health Organization 2021).

Learning new skills that are centred around interests, as well as social contact and participation are all factors that contribute to a better quality of life (Escuder-Mollon et al. 2014). Digital literacy programme participation increases social interaction through meeting people, as well as learning skills to connect online and strengthen existing relationships (Augner 2022). Furthermore, seniors would "be able to motivate, empower and support each other" during the learning process and continue social interaction through technology following formal learning (Blažun, Saranto and Rissanen 2012 p. 1211) In addition to attending library programmes for the social benefits, seniors recognise that participation can teach skills which allow them to adjust to society's changes and integrate into the community, thereby improving their wellbeing (Escuder-Mollon et al. 2014).

"Digital inclusiveness encompasses the proficient use of a range of media and applications" (Betts, Hill and Gardner 2019 p. 416). Library digital literacy programmes can expose senior users to digital magazines and books and provide access to new information that will enrich their lives (Meyer 2015). Seniors who regularly used the Internet to communicate and seek information experience a greater sense of societal belonging (Betts, Hill and Gardner 2015). Furthermore, digital inclusion can support seniors' continued self-reliance and self-esteem in the event of deteriorating health or diminished capabilities (Olphert and Damodaran 2013). Communication through digital technology allows seniors with mobility challenges to maintain social networks (Betts, Hill and Gardner 2015). Competent digital health literacy empowers older adults to actively engage in decision-making and problem-solving regarding their health by enabling them to find, comprehend, evaluate, and share health information from digital platforms. This proficiency facilitates access to telehealth services and health information, which supports personal health management and enhances overall wellbeing (Dong et al. 2023).

Studies have also shown that engaging purposefully in digital skills activities reduces cognitive decline (Betts, Hill and Gardner 2015) and participation in digital literacy classes can improve both language and memory skills of seniors (Augner 2022). Research must discover any wellbeing benefits experienced by participants of the digital literacy programmes. It should also examine if the NLB considers the advantages listed above when designing their digital literacy programmes for seniors and find out if data is collected on the benefits experienced by participants.

3.5 Barriers and Enabling Factors to Learning

It is essential to understand potential barriers and enabling factors to learning experienced by seniors when investigating the NLB's digital literacy programmes and initiatives. Digital inclusion of seniors requires an initial base level of digital literacy, which encompasses technical skills, an understanding of digital tools and mindsets needed to engage with technology and digital information effectively and efficiently (Wynia Baluk, Detlor and La Rose 2023). Furthermore, external and internal feedback influences motivation to learn, participation and ongoing engagement (Tyler, De George-Walker and Simic 2020).

An understanding of the barriers and enabling factors to learning experienced by seniors allows assessment whether the NLB digital programme facilitators take into consideration learning obstacles and

motivators, and to determine if they effectively utilise these factors to develop programmes that support and accommodate the needs of seniors (Vroman, Arthanat and Lysack 2015).

3.5.1 Barriers to Learning

"To achieve inclusion at a macro level, training programmes and policies should be cognisant of the barriers to technology and explicitly address them as a first step, before then going on to outline the positives of digital technology use" (Betts, Hill and Gardner 2015 p. 421). Additionally, Sabo (2017) suggests that barriers to digital literacy learning can arise from dispositional, institutional, or situational factors.

3.5.1.1 Dispositional Barriers

Vroman, Arthanat and Lysack (2015) state that seniors' choices to engage with technology are influenced by psychological factors. The willingness of older adults to participate in digital literacy programmes can be influenced by their self-identity. On one end of the spectrum, ageism embedded in society can present itself in the thoughts of digital literacy programme participants. Due to negative self-perceptions, based entirely on their own age, participants can lack confidence and underestimate their knowledge and skills (Barrie et al. 2021). Even seniors with previous workplace experience with technology can feel disconnected to rapidly developing technology post-retirement. They may exhibit disinterest in new digital content or become daunted by the quantity of information to learn and lack motivation to continue developing their digital skills (Vercruyssen et al. 2023). On the other end of the spectrum, seniors may not identify as older adults and reject adopting the use of technology designed for the senior demographic (Kebede et al. 2022).

A frequently identified dispositional barrier to engagement with technology is a mistrust of the Internet and fears concerning personal data security (Betts, Hill and Gardner 2019). Seniors can exhibit a heightened apprehension towards online safety, computer viruses and hackers (Wynia Baluk, Detlor and La Rose 2023), they express fears of falling victim to scammers or impersonators (Kebede et al. 2022) and worry about the collection and utilisation of their personal data (Betts, Hill and Gardner 2015). These safety concerns may deter seniors from digital engagement and participating in the available digital literacy opportunities presented (Wynia Baluk, Detlor and La Rose 2023).

Furthermore, there are seniors who are cautious with the use of technology because they believe it to be intrusive. They express concern over changes in societal etiquette brought about by a heavy reliance on technology and the need to be "constantly and instantly connected" (Betts, Hill and Gardner 2015 p. 419), and they want to ensure technology does not encroach on their daily lives. Additionally, some seniors cite difficulty in adapting to the expected etiquette in technology practices (Betts, Hill and Gardner 2015).

The research conducted should investigate to what extent the NLB boosts seniors' self-perceptions and motivation, and whether they address data security fears and technology etiquette in their digital literacy programmes.

3.5.1.2 Situational Barriers

Socioeconomic status, which includes education, occupation and income, impacts access to and engagement with technology, and seniors "experiencing multiple social disadvantages may use ICT differently" (Wynia Baluk, Detlor and La Rose 2023 p. 205). The expense of technology can create a situational barrier to digital literacy learning. Older adults living on a low income may not have the financial capability to purchase digital devices or pay for reliable, high speed internet access, which

contributes to reduced skills in digital literacy (Barrie et al. 2021). Lower educational attainment and employment without exposure to technology can be a barrier to the development of digital literacy (Betts, Hill and Gardner 2019). Similarly, "occupational choice and computer use at work were the mechanism through which education affects the adoption and use of ICTs in older age" (Tyler, De George-Walker and Simic 2020 p. 176).

Use of technological devices requires physical dexterity and good vision, and cognitive ability is important for the development of new skills (Kebede et al. 2022). Medical conditions and physical disabilities can impede digital engagement (Barrie et al. 2021), and the natural progression of aging can lead to physical and mental changes and challenges that create barriers to digital use.

Support from family members encouraging the exploration of emerging technology and assisting with access and use of technology can impact exposure to and attitudes towards technology (Ma, Fang and Guo 2023). Singapore's Centre for Research on Successful Aging (2023) found that seniors in Singapore, "seek help from their children (93.35%), friends (79.66%), and co-workers (67.23%) when they want to learn how to use a new digital device or application". Therefore, seniors without strong social networks may be at a disadvantage because they lack access to this informal digital feedback.

Ethnicity and language have been cited as barriers to digital literacy participation. Visaria, Aithal and Malhotra (2023) found that in Singapore, seniors with Malay or Indian ethnicity were less likely to use digital technology. Barrie et al. (2021) include language as a barrier. In Singapore multiple languages are spoken English (48.3%), Mandarin (29.9%), Chinese Dialects (8.7%), Malay (9.2%), Tamil (2.5%) and Others (1.4%) (Singapore Department of Statistics 2020) therefore it is important that language is not a barrier to participation.

Research must examine whether the NLB's digital literacy programmes and initiatives support seniors with situational barriers, with specific focus on whether their programmes cater to seniors with a variety of linguistic and ethnic backgrounds and if there are avenues for seniors without strong social networks to access informal digital feedback.

3.5.1.3 Institutional Barriers

Ageism present in institutions can create barriers to seniors' digital literacy engagement and development. Incorrect assumptions that seniors have shared views on technology, similar digital experiences and proficiency (Quan-Haase et al. 2018) can lead to a standardisation of digital literacy programmes and a lack of differentiation that does not consider the diverse needs of the senior demographic. Educational settings may overlook seniors in their structures or prioritise younger instructors over older ones to teach seniors, which undervalues the knowledge and experience of older educators (Wynia Baluk, Detlor and La Rose 2023). Poor planning for seniors based around "deficit-based thinking" (Barrie et al. 2021 p. 399) fails to highlight participants capabilities or promote confidence in learners. Content delivered too quickly, the use of complex terminology and a lack of differentiation (Betts, Hill and Gardner 2019) can all prevent access to programme content.

The investigation into the NLB's digital literacy programmes and initiatives must explore whether any institutional barriers outlined above exist.

3.5.2 Enabling factors to Learning

Enabling factors to learning encourage and facilitate seniors' use of digital technology. Education and economic advantages enable digital literacy. Seniors with a higher level of education and a higher income demonstrate more online engagement (Quan-Haase et al. 2018). They are also more likely to use technology to improve their social and economic capital; using technology to network, further their careers or work online (Wynia Baluk, Detlor and La Rose 2023). Additionally, younger seniors will continue to use skills developed from the emergence of the Internet (Quan-Haase et al. 2018).

Several research findings show that social networks are a significant enabling factor in seniors' engagement with technology. Seniors' choices to use or reject technology are influenced by family and trusted acquaintances (Kebede et al. 2022). "An informal relational context for learning may create a natural space for learners to shape their learning" (Wynia Baluk, Detlor and La Rose 2023 p. 221), since digital skills and competencies are optimally and most enjoyably learned through social interaction with peers and younger family members. Furthermore, an ongoing "digital feedback" support system improves digital capabilities (Ma, Fang and Guo 2023 p. 3) because when technical difficulties occur, seniors primarily prefer to seek informal support from their social network (Wynia Baluk, Detlor and La Rose 2023). Finally, seniors "with stronger social networks were more likely to use digital technology for general and health-related purposes" (Visaria, Aithal and Malhotra 2023 p. 7).

Tyler, De George-Walker and Simic (2020) posit that self-efficacy is a powerful motivator, which is impacted by past experiences, social influences, and support networks. Seniors with self-efficacy exhibit more trust in online activity and in using technology (Betts, Hill and Gardner 2019), they are more open to experimenting with technology (Tyler, De George-Walker and Simic 2020) and they are more likely to find solutions to digital problems independently (Wynia Baluk, Detlor and La Rose 2023).

Research should explore whether the NLB ulitises the influence of social networks in their digital literacy initiatives and examine if the NLB's digital literacy programmes promote strategies that support the development of technological self-efficacy.

3.6 Best Practice in Digital Literacy Programmes

3.6.1 Curriculum Design

A best practice digital literacy educational model for seniors must be guided by critical geragogy, a philosophy of teaching and learning which fosters autonomy and allows seniors to direct their development (Wynia Baluk, Detlor and La Rose 2023). Critical geragogy recognises life experiences, challenges stereotypes related to aging and develops self-efficacy through harnessing interests, while utilising peer support and collaboration (Creech and Hallam 2015).

To ensure that use of technology becomes part of seniors' daily life, digital literacy programmes should be individualised, meaningful and motivating and foster social inclusion (Martínez-Alcalá et al. 2018). Curriculum design must build upon life experiences and pre-existing interests (Beh, Pedell and Mascitelli 2018), as learners are motivated when content meets their personal and practical needs (Padilla-Góngora et al. 2017). Seniors positively view digital skills that they perceive to have a significant personal advantage, that require little effort to use (Tyler, De George-Walker and Simic 2020) and can be used daily (Wynia Baluk, Detlor and La Rose 2023). Additionally, participants are more likely to attempt new skills and practice them outside of the learning environment when content caters to needs (Schirmer et al. 2022).

Seniors with existing digital knowledge use devices that suit their skills and preferences, and ongoing digital development is driven by personal interests (Hänninen et al. 2023). Therefore, new skills should be taught in ways that connect to seniors' current lifeworld (Suchowerska and McCosker 2022) such as being introduced to apps matching established hobbies and interests, as "demonstrations of the flexibility of the technology" and "how it could be adapted to their own lifestyle" (Betts, Hill and Gardner 2019 p. 1158). In order to deliver programmes like this, digital skills providers need to develop a strong understanding of how seniors use technology in their daily lives (Betts, Hill and Gardner 2015) and consult and collaborate with seniors when planning programmes to ensure they meet their needs.

Vroman, Arthanat and Lysack (2015) say there are three distinct content requirements for seniors: social networking, using technology to access services within the community and connecting with others who share common interests in the wider community. It is essential that foundational skills are taught first (Wynia Baluk, Detlor and La Rose 2023) since multiple elements of technology are interconnected and proficiency in one area presupposes an aptitude and understanding in another area, and "full-fledged digital literacy is beyond reach if the foundations are not taken care of" (Vercruyssen et al. 2023 p. 8). In addition to learning digital operational skills, Betts, Hill and Gardner (2019) assert that seniors seek instruction on protecting their data and safeguarding their identity. Therefore, to build trust in technology and alleviate data security fears, digital literacy facilitators must include data privacy literacy in digital literacy programmes (Kebede et al. 2022).

Meyer (2015) states that planning for digital literacy support should include a skill focus and clear lesson plan. Lessons should be planned with a three-part framework of "initiation, development, and closure phases" to best support learners' understanding of learning objectives and promote engagement (Martínez-Alcalá et al. 2018). The first phase establishes prior knowledge, new information is taught and practical tasks carried out in the development phase, and the closure phase allows for the review of concepts. This structured approach promotes learners' engagement, comprehension and retention.

3.6.2 Instruction Methodologies

Multiple academic sources agree on the essential best practices in digital literacy instruction methodologies which include differentiation, instruction delivery and use of learning materials.

To ensure digital inclusion for the full senior demographic, facilitators should differentiate for learners' abilities and adapt programmes to accommodate a range of abilities by initially measuring learners' digital capabilities and establishing participants' expected level of learning (Betts, Hill and Gardner 2019). Through determining skills and learner expectations, learners can be categorised into four groups: non-users, occasional users, goal-oriented users and advanced users, and programmes can be specifically tailored to meet distinct needs (Quan-Haase et al. 2018). Additionally, seniors with advanced digital knowledge could be identified and utilised to support other learners in valuable peer-to-peer learning. Top of Form

While most research examines group instruction, which is most effective when learners are placed in ability and interest-based groups, there are greater benefits to an individually personalised approach with one-on-one digital training (Barbosa-Neves and Mead 2021). Highly specific one-to-one or small group digital skills support, where participants can ask practical and specific questions, (Wynia Baluk, Detlor and La Rose 2023) was not only preferred by older adults, but it was also found to empower learners, promote the adoption of digital technology and motivate participants to learn new skills (Kebede et al. 2022).

Furthermore, to sustain use of technology and engagement, it is essential to offer support sessions or drop-in digital clinics to assist seniors with technical difficulties when they occur where visitors can receive advice on purchasing digital equipment and applications (Beh, Pedell and Mascitelli 2018) or, using their own devices, support can be provided in a way that replicates the experience of being at home (Horton 2019). Main technical difficulties encountered by seniors include recalling passwords, reproducing process sequences, filtering content, managing software updates, and understanding technical language (Damodaran, Olphert and Sandhu 2014).

Seniors benefit from a repeated-iterative instruction approach (Zhang et al. 2022), where curriculum concepts are repeated in a variety of ways to embed understanding and learners can practice multiple times, while receiving feedback to improve. Consequently, programmes should allow a longer timeframe to ensure that seniors have ample opportunities to learn new skills and practice their learning (Beh, Pedell and Mascitelli 2018).

Finally, to support senior learners, programme facilitators should disseminate handouts of curriculum content (Betts, Hill and Gardner 2019), to ensure that all seniors have access to explanations and are able to review concepts taught (Beh, Pedell and Mascitelli 2018), and these must cater to a range of learning styles (Martínez-Alcalá et al. 2018).

3.6.3 Use of Digital Terminology

Differing views are found on the use of digital terminology in digital literacy programmes for seniors. Vercruyssen et al. (2023) believe that learners must be taught and utilise digital terminology they will constantly encounter when using technology, whereas (Kebede et al. 2022) state that incomprehensible terminology discourages older adult learners and can be a barrier to learning engagement. Barbosa-Neves and Mead (2021) call for inaccessible jargon to be removed but found that some older adults could learn and apply simple, accurate digital terminology, if it were used continually during instruction and demonstrations. Suchowerska and McCosker (2022) assert that older adults gain increased confidence in utilising internet technologies when they receive support in enhancing their understanding of the associated terminology. Therefore, a balance must be found, so that only necessary terminology is used and digital literacy programmes for seniors "teach digital lexicons with language that is accessible and familiar to learners" (Wynia Baluk, Detlor and La Rose 2023 p. 219).

Observations of the NLB's digital literacy programmes must examine whether facilitators are using any of the best practice methods in curriculum design and instruction methodologies.

3.6.4 Assessment

Informal assessments of senior digital literacy programme participants should be performed prior to, during and after the learning process. Initially, to be able to deliver programmes with relevant, practical and engaging content, facilitators should assess the desired performance level of the group and the group's current skill level (Betts, Hill and Gardner 2019). This allows facilitators to identify areas for differentiation, plan programme content and address discrepancies between aspiration and existing competencies in learners. During learning programmes facilitators can ask questions to check understanding and participants can take assessments that allow for multiple attempts, to strengthen skill development and the retention of information (Martínez-Alcalá et al. 2018). Learners should also engage in a self-assessment following programme participation (Creech and Hallam 2015), to evaluate their understanding and develop goals for practice and future learning.

Success of digital literacy programmes and initiatives for seniors must be measured through participant numbers, critiques and evaluations (Meyer 2015), to ensure time and money is well spent (Sen, Prybutok and Prybutok 2022). Participant feedback can inform facilitators on programme successes and shortcomings and allow for changes to be made to improve what is on offer.

Research should establish how the NLB measures the success of their programmes and evaluate if assessment is sufficient or not.

3.6.5 Staff

The approach, communication and knowledge of digital literacy facilitators are significant factors for motivating and encouraging learners (Escuder-Mollon et al. 2014). Subject expertise is essential (Meyer 2015) but to establish a culture of inclusion in the education of seniors, facilitators and instructors need to build a sense of community and inclusive participation, through collaboration with learners to encourage active engagement and for seniors to take responsibility for their learning (Creech and Hallam 2015).

There are contrasting opinions on the best age groups to provide digital literacy support to seniors. Angeloni and Borgonovi (2016) and Sabo (2017) claim that intergenerational programmes foster understanding between generations and build confidence. However, Suchowerska and McCosker (2022) state that success is better achieved through support from those in a similar generation, who can relate to participant's perspectives and lifeworld. Barrie et al. (2021) recommend the use of senior volunteers and Wynia Baluk et al., (2023) state that "peer digital support can challenge the ageist assumption that younger generations have digital know-how that older adults naturally lack" (Wynia Baluk et al., 2023 p. 221).

Regardless of the age of staff delivering digital literacy programmes, in order to adequately support seniors, educators, "need to suspend their assumptions about older learners, test their own prejudices, and learn to be more self-critical" (Creech and Hallam 2015 p. 46). To motivate seniors to learn they must be empathetic and understand the challenges and barriers to learning that seniors might face (Vercruyssen et al. 2023) and be able to provide more reassurance (Tsai, Shillair and Cotten 2017) to create a supportive environment for optimal digital literacy learning.

4. Methodology

The overall goal of the research was to evaluate the NLB's digital literacy programmes and initiatives for seniors and determine if they successfully meet the needs of the senior demographic in Singapore. Having considered the breadth of the research required to develop a comprehensive understanding of the digital literacy programmes, a multiple-methodological approach was used to collect different types of data. This mostly comprised of qualitative methods such as observations and interviews, combined with a small selection of quantitative numerical and statistical data. A multiple-methodological approach was chosen, since due to "the potential frailties and weakness of one kind or another in evidence" (Thomas 2013 p. 22) the gathering of diverse evidence in different ways enabled conclusions to be drawn from a variety of sources. Additionally, a multiple-methodological approach allowed for triangulation at the point of data analysis to develop a more complete and in depth understanding of the digital literacy programmes and initiatives, which reinforced the validity of the research findings.

4.1 Quantitative Data

The researcher attempted to obtain secondary numerical and statistical data from the NLB for information on participant numbers and demographics, as well as data on the subject areas covered in the digital literacy programmes in different libraries. Despite efforts to acquire data, requests were not met with a response. However, using an alternative data source, Eventbrite's 'GoLibrary Programmes for Seniors' page (Eventbrite 2024), it was possible to collect information on the programmes' subject matter, language of delivery, format of delivery (in-person or online), and programme partnerships. Since the COVID-19 pandemic would have impacted all library programmes it was decided that data would only be collected from the two years from March 2022 to March 2024.

4.2 Qualitative Data

Qualitative data from observations and interviews with both programme facilitators and participants allowed for an insight into different perspectives and provided detailed information about the attitudes and beliefs of the interviewees to share an insider perspective (Bell and Waters 2014) into the digital literacy programmes.

4.2.1 Observations

Initial qualitative research began with participant observations, where the researcher actively engaged in the digital literacy programmes to observe the specific programme's organisation, instructors' teaching methods (identifying evidence of best practice as highlighted in the literature review) and participants' engagement. Initially the researcher had intended to conduct unstructured observations. However, semi-structured observations were later chosen as the most advantageous method, as it allowed for a framework of key criteria to be identified and evaluated and also permitted flexibility for additional observations beyond the framework. The purpose and scope of the research was communicated to the senior management of the NLB who facilitated access to the observation of programmes without the need for explicit consent from individuals being observed. The researcher took the role of a participant observer, participating a little but primarily explicitly focusing on events and behaviour within the sessions in a non-obtrusive manner, observing as objectively as possible to avoid imposing their own interpretations on what was observed (Bell and Waters 2014), while recording notes and scores on a pre-made data table with broad headings (see Table I, below). The data table organised elements during the observation. The seven observations were used as a pre-study, to gain familiarity with the digital literacy programmes for seniors and to aid the preparation of questions for the interviews.

Table 1: Observation Table

Observation Grid for _____

	Numbers	Notes
Engagement Level:		
Participants' engagement		
Technological Proficiency:		
Ability to navigate digital devices		
Comfort level with various software and applications		
Social Interaction:		
Extent of social interaction in group		
Role of facilitators in fostering a supportive community		
Content Comprehension:		
How well participants understand		
instances of confusion or successful comprehension		
Connects to lifeworld		
Digital terminology		
Inclusivity:		
inclusivity of the group, considering gender,		
Facilitators make efforts to involve all participants		
Assistance and Support:		
instances where participants assist each other		
Facilitators' support in addressing individual challenges		
Comfort Level:		
Comfort level in expressing opinions		
Barriers inhibiting open communication		
Facilitator Effectiveness:		
Effectiveness of the facilitator in delivering content		
Communication skills and responsiveness to participants'		
Assessment of skills		

1= to a very low degree or not at all
2= to a rather low degree
3= to a rather high degree
4= to very high degree
X= cannot be observed or is not relevant in this context. If so, comment why

4.2.2 Interviews

Snowball sampling was used to connect with specific stakeholders within the NLB. The first point of contact was a professor at a local university who has published several articles on information literacy and libraries in Singapore. He provided guidance on the avenue for contact with senior staff at the NLB who are responsible for coordinating the digital literacy programmes, organisers and instructors. Correspondence with a senior member of the NLB resulted in an introduction to a librarian working in the team organising digital literacy programmes and initiatives for seniors, and an appointment with a facilitator for an interview. This facilitator was instrumental in enabling access to other facilitators and programme participants for more interviews. The NLB digital programme organisers did not respond to requests for interviews about their programme aims and objectives and community partnerships. However, semi-structured interviews were successfully conducted with two different groups: digital literacy programme facilitators and participants.

The researcher's original intention was to use purposive sampling to select participant interviewees to survey a good balance of gender, age and relevant prior technological knowledge. However, the researcher found that there was not a broad demographic of digital literacy programme participants to select, as most were retirees who had moderate to good digital skills. Furthermore, some participants were reluctant to be interviewed. Therefore, convenience sampling was used.

Interviews with six programme facilitators, four male and two female, investigated the NLB's digital literacy programme objectives and structure, methods of support or instruction, participant engagement, challenges and successes, use of terminology, library partnerships and programme promotion. Interviews with five programme participants uncovered interviewee's experiences with the digital literacy programmes and initiatives, their barriers to learning, their needs as learners, their motivations for and frustrations with participation and their hopes for provision in future programmes and initiatives.

4.3 Interview Schedule

An interview schedule of pre-determined, open-ended questions was tailored for the different groups to prompt discussion and allow for freedom of conversation, elaboration and exploration of themes appropriate to the research. A combination of different types of interview questions, specific to the line of investigation and influenced by the findings in the literature review were used, such as introductory, probing, specifying and indirect questions (Brinkmann and Kvale 2018).

It should be noted that some of the interviewees had English as a second language, so at times during the interview the questions had to be simplified or elaborated to be fully comprehended. The interview questions were presented to programme instructors in advance and to programme participants at the start of the interview. Each interview lasted 20-40 minutes, depending on the depth of information provided and any useful tangents to the research questions. Interviews were recorded on two different devices and later transcribed. The researcher was the transcriptionist because the original intention of using a speech to text computer application for transcription was not possible as the automatic speech recognition system used could not accurately identify the words spoken by any of the interviewees (for the interview questions, see Table 2).

Table 2: Facilitator Interview Questions

Professional Background
1. Are you a volunteer?

2. How many years of experience do you have in instructing digital programmes for seniors? 3. What is your background for supporting the subject of digital programmes for seniors? 4. Have you received any specific training related to instructing seniors in technology?
Introduction 5. Can you please provide an overview of your role in the delivery of digital literacy programmes for the NLB?
Initiation and Objectives 6. How did your work delivering digital programmes for the NLB come about? 7. How did the library outline the specific objectives or goals they expected you to achieve?
Programme Structure 8. Can you describe the format and structure of your sessions? 9. How are topics or themes for each session selected? (Later would you be able to provide a list of some of the topics covered?)
Participant Engagement 10. How does the library encourage participants for your programme? 11. Do you collaborate with other community organisations or partners to enhance the reach and impact of your digital programmes for seniors? 12. What strategies or activities have been successful in keeping participants engaged? 13. Are there common challenges or gaps in digital literacy that participants tend to face, and how do you address them?
Feedback and Adaptations 14. How do you gather feedback from participants regarding their experience in the digital support group? 15. Have there been any adaptations or changes to the programme based on participant feedback?
Technology Access 16. What considerations are made to ensure that seniors have access to the necessary technology for your sessions?
Impact of Programme 17. Can you share any anecdotes or stories that highlight the impact of your programmes on participants?

Challenges and Successes
18. What are some common challenges faced in facilitating digital learning for seniors?
19. Can you share a success story or a particularly positive outcome resulting from your sessions?
Future Plans
20. Are there any plans to expand or modify your sessions in the future?
21. How do you envision the long-term sustainability your programme/sessions?
Use of Technological Terminology
20. In your teaching approach, do you use technological terminology? Why or why not?

4.4 Data Collection and Analysis

An interpretivist philosophical approach was used to gain "rich and contextually situated understandings" (McChesney and Aldridge 2019 p. 227) of the content and instruction methods of the digital literacy programmes, as well as facilitator and participants' perspectives of the programmes, to assess the success of the NLB's digital literacy programmes and initiatives in meeting the diverse needs of Singapore's senior demographic.

Analysis of the quantitative data collected from programme listings on Eventbrite provided a summary of the programmes offered, which specifically highlighted the NLB's priorities in the subject focus and language of delivery. Evidence recorded during observations on programme content and instruction was assessed. Patterns that emerged were noted and best practice theories from research were identified.

The majority of the data informing the research was gleaned from insight into the perspectives of the stakeholders interviewed and the theories developed from these. The interviews were analysed using thematic analysis, which was completed in five stages. The process began with noting key points and summarising lines of text in each transcript. When all transcripts were summarised, the next step was to code each interview. This was a process of data reduction, that included "selecting, focusing, simplifying, abstracting and transforming the data" (Gorman et al. 2005 p. 207). The transcripts were carefully examined, themes or ideas relevant to the research were labelled and irrelevant information was excluded. These codes were put into comprehensive summary tables that combined either all participants or all facilitators interviewed, and colours were used for easy interviewee identification. The summary tables allowed all preliminary codes to be viewed and analysed together, so that common themes and sub-themes were easily identified and combined into a new table. Once the qualitative examination of themes unique to the two different groups of interviewees was completed, a comparative study was conducted between facilitators and participants, to identify similar interviewee perspectives of the programmes, especially in relation to successes, shortcomings and expectations for future programmes and initiatives.

After the interviews were fully analysed, the data was triangulated. The quantitative data showing programmes' subject, language, location and partnerships was analysed together with best practice findings from the observations and key themes emerging from interviews. A final evaluation was made to highlight areas of success, areas needing improvement and on how successful the programmes and initiatives are overall in meeting the diverse needs of the senior demographic.

4.5 Ethical Considerations

Consent and approval from the NLB was requested prior to beginning primary qualitative data research through digital literacy programme observations and interviews with facilitators and participants. Observations were conducted in a manner that ensured that both the participants' and facilitator's privacy was not compromised. Consent was sought from programme facilitators and participants prior to being interviewed. The format of the consent form was informed by an example found online (Trinity College Dublin 2020). Research objectives were explained through "clear, articulate communication and explanation" (Arrant 2020 p. 3), to ensure all participants fully understood the implications of their consent. Interviewees were informed that interviews would be recorded and told that information collected would maintain their anonymity and they had the right to withdraw their consent at any time. They were also informed that all data would be stored in a secure location that is only accessible by the researcher and would be retained only for a period of 12 months following submission of the research dissertation.

5. Findings and Discussion

Results and findings derive from quantitative data on programme location, subjects and partnerships, and the language of delivery, as well as observations and semi-structured interviews with digital programme facilitators and participants.

Key themes that aligned with the literature review research on barriers to learning, curriculum design, assessment, staff and benefits of digital literacy programmes for seniors were identified through interviews with programme facilitators and participant learners.

Subsequent requests for interviews with a chief executive in the NLB and a library officer in the team for digital literacy programmes for seniors, to discuss community partnerships and the NLB's vision for supporting seniors' digital literacy, as well as requests for data were deferred and not responded to. As an alternative solution, data had to be collected from the Eventbrite booking page, 'GoLibrary Programmes for Seniors' (Eventbrite 2024).

Methodological triangulation and evaluation of multiple perspectives allowed for a comprehensive understanding of the NLB's digital literacy programmes and initiatives for seniors, which revealed curriculum priorities, participant motivations, best practice in programme delivery, partnerships, programme successes and issues and shared aspirations for the NLB's future digital literacy programmes and initiatives for seniors.

5.1 Quantitative Results of Programmes

Requests made to the NLB for data on digital programme attendee numbers, participants' age and gender did not receive a response. However, data on the subject category of programmes, language delivery of programmes, whether they were conducted in person or online and programme partnerships could be gathered through Eventbrite's 'GoLibrary Programmes for Seniors' page.

Data was gathered from only two years of the NLB's digital literacy programmes for seniors, in order to focus on current trends and avoid including years when the COVID-19 pandemic closed libraries and impacted all library programmes.

5.1.1 Subject Focus of Programmes Offered

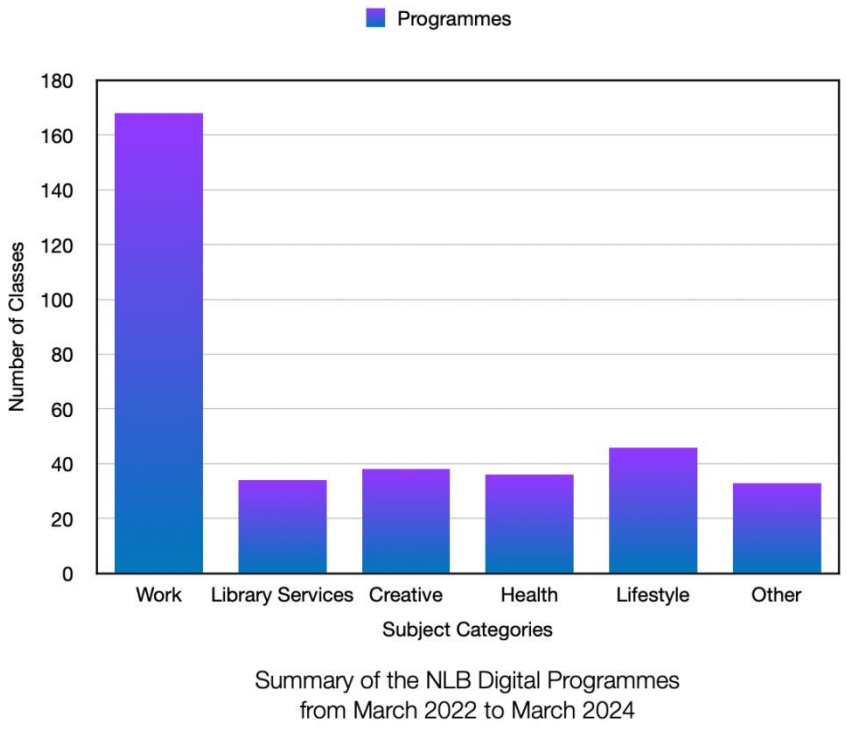

Figure 1: Subjects of digital literacy programmes

It was a challenge for the researcher to accurately gauge the subject of all programmes from a short synopsis on Eventbrite, but information from the programme series and partnerships with other organisations was used to inform decision making. For example, 'Future of Work' programmes are aimed at seniors who are still in employment and placed in the 'Work' category, since the series is promoted as enabling participants to "Keep updated with the evolving needs at work and equip yourself with the skills required for the future workplace" (Eventbrite 2024).

The data from Figure 1 shows that currently, in the digital programmes offered by the NLB, there is a balance in five distinctive subject areas, but the predominant focus is on work related programmes, under the series 'Future of Work'. 'Other' was either designated to programmes that were introductory showcases of different types of technology, or had a dynamic focus that changes each session, thus preventing them from being categorised under a single subject focus, such as the Digital Café.

In Singapore, the minimum retirement age is 63 but employees are legally allowed to continue to work in their organisation up to the age of 68 (Ministry of Manpower 2024). The most recent population data of Singapore citizens from the Department of Statistics Singapore (2024) shows that there are 1,037,968 50- to 69-year-old adults and 442,361 above 70, (it should be noted that specific data on non-Singaporean Permanent Residents was not available). The NLB's digital literacy programmes and initiatives for seniors are open to Singaporean and Permanent Resident adults aged 50 upwards, so although half of all programmes meet work related skills, analysis of the demographic shows that these work-related programmes could be relevant for a large majority of the 50+ population.

5.1.2 Programme Language

Table 3: Programme language delivery

Programme Language Delivery

Advertised Language of Programme	
English	341
Chinese (Mandarin)	13
Malay	1
Tamil	0
Dual: English & Chinese	1
	356

The data in Table 3 shows that English was the predominant language used for the NLB's digital literacy programmes for seniors between March 2022 to March 2024, with 96.07% of programmes in English, 3.93% in Mandarin, 0.2% in Malay and no programmes in Tamil. Figure 2 and Figure 3 illustrates that the language delivery of programmes does not align with languages spoken in the local population (as referred to in the Literature Review).

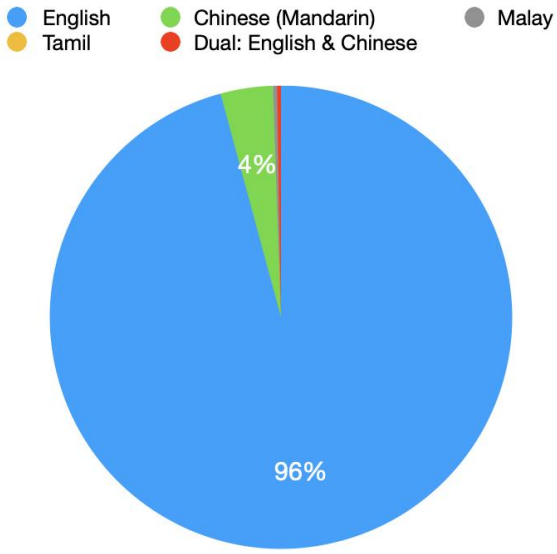

Figure 2: Programme language delivery

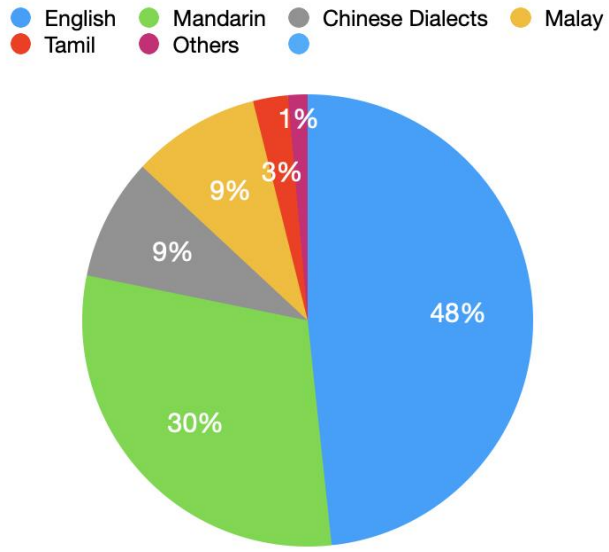

Figure 3: Languages spoken in Singapore

5.1.3 Programme Location

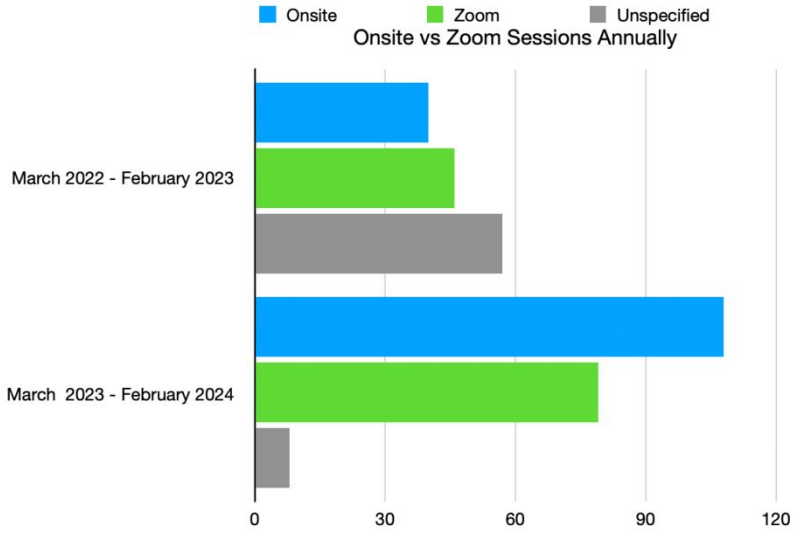

Figure 4: Annual Comparison of Onsite vs. Zoom Sessions

Not all past programmes shown on Eventbrite's 'GoLibrary Programmes for Seniors' page listed their location, so accurate analysis was not possible. However, Figure 4 shows that in the last year there has been an overall increase in programmes for seniors and suggests a trend towards more onsite programmes than the previous year, possibly because of cessation of all COVID-19 measures and a return to more face-to-face engagement. Virtual sessions have marginally increased.

5.2 Facilitator Interviews

5.2.1 Programme Planning - Government Objectives versus Learners' Needs

Five of the six facilitators explained that their programme curriculum is dictated or created (with a lesson plan and pre-made slides) by either the NLB, other government agencies or community partners. Even Digital Ambassadors offering pre-booked or drop-in digital support in libraries are restricted to specific subject areas. All programmes and initiatives align with the government's objectives for the digital development of seniors.

Two facilitators said they can offer suggestions or make minor adjustments to programme content, "they give me the slides in advance and I can do my own filtering of the material." Some adjust the time they spend teaching specific content, to meet participants' needs and questions, as one explained, "If I'm on the ground trainer I'd rather have more time to communicate with others, because only then you can get more closer and get more questions from them. So, material wise I can go through quickly."

One facilitator, a digital literacy pioneer who volunteered his services before senior digital literacy became a key government objective, has autonomy compared to others:

> *The library encourage[s] seniors to adopt lifelong learning. I come to be aware of it and I request[ed] the library give me the facilities, that means the venue and the projector…for me to conduct my experience and to share with them what I know.*

Autonomy has allowed him to deliver content determined by knowledge gaps he observes, senior's requests and digital trends, as well as government objectives. To cater to specific needs of the demographic he ensures consolidation of core topics, "And why I need to repeat the topic is because seniors are seniors, sometimes they even forget what they have learned…they are very happy to come back for a refresher course." Additionally, he gives special consideration to where and when his workshops take place:

> *I make it fixed in venue and in date…If [I] keep on changing the day and all that then they will get confused, so it's easier for them to plan. I choose Saturday because I'm also catering to those who are about to retire. So that they can come and see retirement can be meaningful to them, if they pick up something to learn or to do.*

Catering to learners' needs, specifically in workshop content, results in participants unanimously commending his programme and recommending it to others. This demonstrates that, as found in research, personalising the needs of the learner is a contributing factor in the effectiveness of the digital inclusion programmes for seniors (Betts, Hill and Gardner 2019).

"Adult learning is about exercising self-determination over what one learns" (Tyler, De George-Walker and Simic 2020 p. 188) and there was consensus among facilitators that, although government objectives were important, seniors' interests were paramount, "You must find something that interests them", said one facilitator. Another explained, "if they're really interested, they will learn." One facilitator recommended a committee of volunteers, trainers and participants share ideas to cater to exactly what seniors want.

A different view was presented by one facilitator who believed that interest was important but to support seniors' ability to live their optimal life in a rapidly developing digital environment, they must be urged to

develop new skills beyond their interests, “They are inhabiting a different realm, a different world…So force them and you'll find that their world changes.”

5.2.2 Curriculum Focus

The Infocomm Media Development Authority (IMDA) Digital Ambassador explained their support in libraries focuses on three key areas: Communication, Digital Government Services and Cyber Security. After instructional sessions and following the best practice standards for digital inclusion classes (Betts, Hill and Gardner 2019), participants are given booklets to review, practice and reinforce learning (Info-communications Media Development Authority 2023). Booklets address four specific subject areas, with distinct focuses in each: Find Info Online, Communication, Transactions Online, Be Safe, Smart and Kind. This is in line with the two of the three content requirements. Vroman, Arthanat and Lysack (2015) recommend for seniors of using technology to access services, and social networking.

Other facilitators cited that skills to meet practical needs, such as accessing payment and government services through apps was a government priority reflected in programmes. Online safety and cybercrime protection was repeatedly raised as critical in digital education. Facilitators felt that seniors are more at risk than younger, more cautious digital natives and fear negatively coloured seniors’ view of the digital world, as one said, “they are scared, there are a lot of scams.”

When asked about their use of digital terminology, some facilitators felt essential jargon must be explained and applied alongside practice. One stated:

> *If it's the correct way then it should be done but you have to keep on explaining and telling people, this ‘a’ means this, this ‘b’ means this. If it's so complicated it's too much, then the seniors will not be interested.*

Another preferred making jargon more accessible, “I have to lower the language in such a way that I can engage with them, and I really simplify the explanation.”

5.2.3 Barriers to Learning

Facilitators highlighted three barriers to learning. The most significant was language. Nearly all the NLB’s digital literacy programmes for seniors are conducted in English but, as one facilitator highlighted, “most of them don't have English as their first language.” Facilitators explained that many Singaporean seniors, specifically those at retirement age and above, speak one or more of six Chinese dialects as their first language and would prefer to attend programmes in Chinese. One facilitator was cognisant at his inability to meet participants’ needs:

> *Some of them will tell me, ‘Can you speak Mandarin in the class?’ I say, ‘It's quite torturing for me because I don't know most of the technical words in Chinese. I have to use [my] dialect to explain to you*.

Another facilitator reflected that since Malay was a lingua franca in Singapore prior to the 1970s, it would be more practical to offer programmes in Malay. Many remarked on the significant absence of participants from Malay and Indian communities, reasoning that the absence of programmes in their preferred language discouraged them from attending.

The second most significant barrier to learning was the lack of ongoing digital support, which especially affected seniors without strong social or familial networks. Facilitators felt it was unrealistic to expect learners to successfully continue a skill independently following one workshop, they "may learn about it but they have a problem with implementing or executing." One facilitator said seniors may experience daily digital challenges and there was no avenue for them to seek immediate help, because Digital Ambassadors were restricted by their "buffet list" of mandated focus areas and there were no digital support groups or volunteers available in the library.

Finally, fear and confidence presented as a barrier preventing seniors from embarking on their learning journey. One facilitator said, "A lack of confidence will hamper them from starting…if they don't start, they will never move in, and if they don't move in, they will never practice…[a] lack of confidence will just stop everything." One facilitator talked of supporting learners through their fear, "my goal is to ensure that whatever doubt they have, whatever learning journey they are going through, their obstacles are always being removed by me." Another described developing participants' confidence through teaching repeated steps, which learners would write down and practice several times, which is repeated-iterative instruction, a best practice approach described by Zhang et al. (2022).

5.2.4 Areas for Improvement

The predominant challenge every facilitator shared was delivering programmes with a uniform educational approach, which failed to cater for participants' range of digital competencies. One explained, "I think the library shouldn't go on a mass programme because people come in and are very diverse, and when someone is talking you see some people walk out, they lose interest." Another said:

> *[it] is very hard to get a common group of common understanding, or [a] common level of understanding, you can say almost impossible. When they come, you notice the whole class; some of them know more, some of them know less.*

To address this challenge all facilitators felt there should be differentiated programmes to cater to learners' abilities. One said many, "did not know the basics but wanted to advance fast, so they need to be taken to basics," while another emphasised the library, "should start on the 101 things for seniors, like very basic." To successfully differentiate for interest and ability, another recommended that the NLB use their online feedback forms to encourage participants to share what they know, have learned and want to learn.

Facilitators recognised that differentiated programmes would lead to smaller groups, but felt this was beneficial. One stressed that beginners needed one-to-one support and hands-on activities. In larger groups, "We talk, talk, talk…they don't understand. We [must] show them." Blažun, Saranto and Rissanen (2012) stated that digital learning activities which encouraged communication allowed seniors to "feel more involved, needed and valued." A facilitator echoed the learning benefits of communication and discussion saying, "The whole group will start to feel relaxed and start to participate more. When you answer to one person's question it's a learning point for others."

A repeated topic among interviewees was a desire for the NLB to facilitate informal digital support groups in libraries. One facilitator recognised that, "Seniors learn through friends and through informal sharing opportunities." Another stated that libraries are, "well spread in Singapore" and are "a very conducive environment" for developing seniors' digital skills, so "should offer more peer group forums. There is a higher level of engagement and people can use their practical skills, and there is a better retention of information." To meet participants' needs for ongoing support one facilitator created a 'Coffee Chat' group for seniors to meet weekly to extend their digital learning and resolve challenges through peer

support. When people are unable to attend, they can also seek help through a Coffee Chat WhatsApp group.

When questioned about learning areas that needed more emphasis, all facilitators expressed the need for more programmes for beginners. Several discussed the versatility of Artificial Intelligence (AI) and how it can be used for planning trips, communication, social engagement and information seeking, and felt seniors would benefit from more library programmes to teach AI use. A few mentioned the need for more programmes to support creativity, like film making, photography and image editing.

Several facilitators recommended better marketing to reach a greater and more diverse group of seniors. Suggestions were made to promote via Short Message Service (SMS), to offer incentives such as food or games and to encourage participants to bring friends. One facilitator wanted easier ways for seniors to enrol onto initiatives, saying only seniors with existing digital skills could use Eventbrite or the Library App to join events and navigation of these was not easy, “If you go in there and you're totally unaware, you don't know where to click, you don't know where to go in the programme.”

Finally, several facilitators talked about the need for all staff and volunteers to have formal educational training, saying they should know how to engage an audience, encourage conversation and effectively deliver content using structured methods which include an introduction, instruction, practice and review. As one facilitator stated, “the difference is in the material and I'm sorry to say the different trainers and how they deliver it.”

Mirroring a recommendation to utilise senior volunteers for digital literacy programmes (Barrie et al. 2021), one facilitator felt that retired volunteers’ knowledge and capabilities should be better utilised, “some of them can do a better job” than the instructors employed, he said, but were more often used as ushers or backup support.

5.3 Participant Interviews

5.3.1 Motivation for Participation

The five participants interviewed identified two distinct motivating factors for engaging in the NLB’s digital literacy programmes and initiatives for seniors. All five interviewees were retired and had previously worked in jobs that required digital competencies. Most explained they wanted to keep busy during retirement, as one said, “I think there was probably a vacuum in most people's lives when they retire, and I started to look in for opportunities to be engaged with other people.” All wanted to maintain their existing digital skills and stay current with changing technology; one participant said that after retirement she began losing her digital skills, another explained, “We need to keep up with the times, especially [in] Singapore, the government is pushing for digital literacy and everything is moving at quite a fast pace.”

5.3.2 Benefits

The benefits of participation in digital literacy programmes for well-being found in the research were clearly reflected in the interviews. Participants collectively emphasised the social benefits of taking part in the digital literacy programmes. One participant said programmes provided a means of “fellowship,” another talked of, “bonding, getting together to talk about common things” and a third stressed the need for participants “to be engaged with people…that is something that some of them look forward to.” One interviewee talked about how the digital literacy programmes helped to maintain strong cognitive health of the increasing aging population, “if you don't occupy your mind creatively with certain information and learning skills it can deteriorate.”

Additionally, participants shared stories of self-efficacy, confidence, and joy in learning digital skills. One spoke of a participant who freed themselves from their heavy reliance on family member support when using government and payment services, after they learned to use the apps. Another talked about the excitement of saving money by reading the newspaper on the library app instead of purchasing daily newspapers.

5.3.3 Passing it On

Informal learning was a recurring theme in all interviews. Each participant talked about the value of either informally sharing information from their own digital learning with peers, or learning skills or information about recent technological advancements from peers. This aligns with Tsai, Shillair and Cotten (2017) who posit that ongoing support was "crucial to give the confidence to experiment and learn new functions" (Tsai, Shillair and Cotten 2017 p. 46). Additionally, following programme participation, five of the interviewees were motivated to join digital advocacy groups, that support seniors' digital skills.

5.3.4 Competent Programme Facilitators

The age and proficiency of programme facilitators emerged as a focus in interviews. Interviewees felt that programme facilitators either needed to be of the same age demographic: "I can tell you that seniors like to know from seniors. Seniors have the patience to teach the seniors," or, as another interviewee stated, they needed formal training to be able to teach seniors well and connect to their lifeworld: "Maybe you have to go back to their [the participants'] younger days, speak their language, know their background." This reflects the assertion that having instructors who can relate to participants' perspectives contributes to the success of senior learners (Suchowerska and McCosker 2022). Interviewees also described the importance of "respectful interpersonal relationships" described by Creech and Hallam (2015); one interviewee felt that facilitators needed to "engage in good conversation" and another said they needed, "empathy, praise and appreciation" with learners.

5.3.5 Improvements

Participants' perspectives on improvements to the NLB's digital literacy programmes and initiatives directly aligned with views expressed in interviews with facilitators. Many noticed the disparity in the digital competencies of seniors attending programmes and felt that there should be differentiated teaching. Interviewees also expressed the benefits of small group learning, which one participant said to be "closer and more cozy," whereas, as another explained, "in the classroom format there isn't very much opportunity to interact with each other because it's just one-way lecturing."

Several felt that the large group lecturing model was over utilised and there needed to be more practical engagement with technology; as one interviewee reflected, for example: "I find that the content in some of the courses is very one-way and you don't give them any hands-on or engagement activities."

Consistent with Beh, Pedell and Mascitelli's (2018) view that it is essential to offer seniors ongoing digital support, interviewees talked about the need for seniors to have an avenue for continued support of their digital learning, and felt that the NLB needed to provide for this beyond the IMDA Digital Ambassadors; as one said, "It's not just a matter of teaching and then that's it already, sometimes older folks may need somebody to hold their hand and journey along." Over half of the interviewees attended the Coffee Chat group outside of the library, which was created when a digital programme facilitator felt that support beyond his programme was needed.

5.4 Observations

The eight observations conducted gave an insight into instruction methodologies, participants' engagement and examples of best practice, as found in research discussed in the Literature Review, and participants' engagement.

5.4.1 Challenges and Issues with Booking Systems

The booking system to participate in digital literacy programmes requires a good level of digital proficiency. Although the NLB digital literacy programmes are advertised on the NLB app and website, booking for programmes must be done through the Eventbrite website. Users have to create an Eventbrite account and use their library username when booking. Once booking is completed an Eventbrite ticket is created. This ticket can be used for access to onsite programmes. However, to access virtual programmes the NLB sends a follow up email with a link to join a Zoom video conference, and this was not explained on the booking site when the researcher made bookings for observations. Following two unsuccessful attempts to join virtual programmes, the researcher raised this issue with the NLB and, within a week, the NLB added extra information to their pages in Eventbrite to provide clarity on the booking process, as shown in Figure 5.

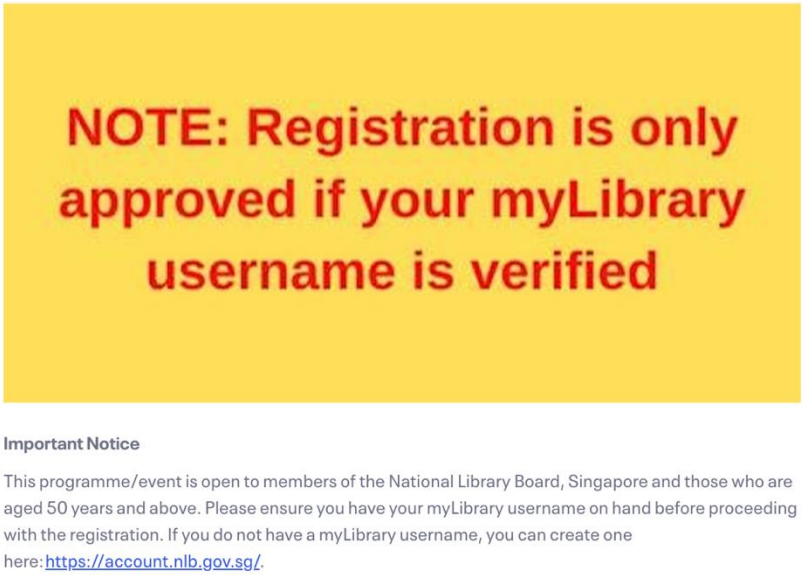

Figure 5: Notice on the NLB booking system on Eventbrite

Booking for the 'Library Learning Journey' workshop, which teaches seniors how to download and use the NLB Mobile app, thus providing access to electronic reading materials and resources, must be done through a physical visit to a local library. The IMDA Digital Ambassadors conduct the Library Learning Journey, so they process the booking at their library pop-up stations and send a confirmation text message to participants' phones. Once participants have booked a digital session at the library through the IMDA they can only cancel or change bookings by returning to the library in person.

The researcher's first Library Learning Journey booking was unsuccessful. Although the programme was advertised on the IMDA website, the booking was made by an IMDA Digital Ambassador and a confirmation was received, the researcher travelled to the library and found that the session had been cancelled due to the date falling on the morning of the eve of Chinese New Year. Conversations with

library staff showed a lack of awareness regarding the IMDA's partnership providing library services. This included not knowing how library patrons book a place for the Library Learning Journey (they assumed it was online), as well as the information content of the workshop.

The researcher returned to their local library to book another Library Journey. Again, the programme was advertised on the IMDA website, the booking was made by an IMDA Digital Ambassador and a text message confirmation was received, but when the researcher travelled to the library, staff found that the researcher's name was not on the list of participants and the session had been booked by a regional community senior centre. However, the facilitator invited the researcher to join the group, and the observation of the Library Learning Journey was successful.

5.4.2 Best Practice Observed in Digital Literacy Programmes

Martínez-Alcalá et al. (2018) posit that digital literacy programmes should be individualised and promote social inclusion. Furthermore, to ensure participant interest and understanding they should follow a three-part framework that includes establishing prior knowledge, imparting new information, allowing for practical tasks and a concept review.

All sessions had a clear, pre-planned subject focus that was shared at the start of the slideshow. The four programmes observed as part of the annual 'Tech Bazaar' promoted social inclusion by introducing new technology which could be beneficial to seniors. However, large audience sizes resulted in a non-individualised, lecture teaching model, with little audience participation and no differentiation. Some facilitators attempted to gauge prior knowledge with questions, but presentation content was not adapted following feedback. For example, in a session about health wearables, only two participants in a group of approximately 80 said they used a smartwatch, but some content that followed assumed a prior understanding of smartwatches. There was no opportunity for practical tasks in these sessions. In all four programmes the audience appeared initially interested but less engaged as the session progressed.

The aim of social inclusion was also clearly seen in the programmes about phone accessibility features and information security, not only was the session content inclusive but a smaller audience was actively engaged by skilled instructors who asked questions and shared anecdotes while delivering information. The facilitators demonstrated a more personalised approach; they encouraged questions, allowed for useful tangents to consolidate or supplement learning and also included practical tasks. The skills taught exhibited additional best practice because it connected more directly to their current lifeworld (Suchowerska and McCosker 2022) and participants exhibited a high level of interest through the programmes.

All the programmes observed required participants to have existing digital literacy competencies. Some foundational skills were taught in only one programme. Facilitators in all programmes used digital terminology and terms were explained and reviewed more than once. There was no promoted means for participants to seek follow-up support after the programmes, but in nearly all sessions library staff collated and displayed books related to the programme for participants to borrow and learn more. Future digital literacy programmes were also publicised. Bottom of Form

Betts, Hill and Gardner (2019) state the benefit of curriculum handouts to review concepts taught. In one programme the facilitator had created a blog where handouts were posted prior to sessions. These were printed and given to participants during sessions too. No other programme had handouts, although participants were informed that the slides from the presentation or a recording would be available on the

NLB platform Panopto (although at the time of writing results the researcher noted that the Panopto had been out of operation for over two months).

5.4.3 Partnerships

In their 'Innovations Through Partnerships' report (National Library Board 2023), the NLB stated that COVID-19 encouraged them to, "think out of the box and trial new initiatives, services, programmes, and forge new partnerships." The research conducted through observations, data and interviews exhibited the extensive network of diverse partnerships that the library has collaborated with to support the digital development of seniors in the community. These range from public departments within Government of Singapore like the IMDA, (which is a statutory board under the Singapore Ministry of Communications and Information and provides the Digital Ambassador services in the library) and community groups and volunteers, to private technology or adult education companies.

The NLB two-day 'Tech Bazaar' that the researcher attended featured technology showcases and talks by medical systems providers, AI and virtual reality for health software suppliers, an esports company, an information and services platform for seniors and a business management company that supports the efficient utilisation of technology. The bazaar was supported by volunteers, including the senior citizen volunteers, 'Silver Infocomm Wellness Ambassador' (SIWA). The bazaar had a strong attendance as several hundred seniors from community centres, senior social groups, digital clubs and retirement homes were bussed to the Central Public Library to participate.

Other programmes observed outside the bazaar were taught by volunteers or trainers from the business process management company Edukinect or the adult education and consultancy Training Vision Institute (TVI). Further investigation into their company objectives show that Edukinect and TVI are primarily focused on delivering digital skills to people in employment.

6. Conclusion

This research set out to explore how successful the NLB's digital literacy programmes and initiatives are in meeting the diverse needs of the senior demographic in Singapore. The objectives were to examine the programmes' aims and objectives, to investigate programme partnerships and establish what benefits they provide, and to identify and evaluate programme practices and compare them to best practices found in research.

The study found that the NLB is fully committed to actively supporting government objectives to ensure that the senior demographic develops skills to access and utilise essential services, stays current with changing technology, understands digital safety and are acquainted with technology which would be beneficial to them. To do this the NLB has forged strong partnerships that can support the NLB's LAB 25 'Equaliser' mission (National Library Board Singapore 2021) for the digital inclusion of seniors. These partnerships contribute to the wide variety of programmes available and facilitate exposure to new technology. The NLB partners include government agencies to deliver government objectives, private providers of adult digital education to bring expertise and experience to programmes, digital software developers to showcase new technology and volunteers to support digital initiatives. The study found that, following their participation in programmes, retirees with technological interest or expertise go on to volunteer their services to support digital learning, but they feel the roles they are given do not fully utilise their skills and they could be put to better use to benefit senior learners.

The research revealed that a majority of programmes are under the 'Future of Work' series for seniors in employment and nearly all programmes are conducted in English, which excludes non-English speakers and reduces relevance for retirees. It revealed that facilitators are provided with lesson plans or slides to execute instruction, and both facilitators and participants want more involvement and autonomy deciding the programmes offered and planning the curriculum taught. It was felt that the curriculum should connect to seniors' lifeworld and specific needs and interests. To do this, improvements should be made to feedback collection methods so that participants can share views on successes and deficiencies and make suggestions for learning content.

The study found that there are currently no programmes for beginners, participant sizes can be large, and facilitators find it challenging to differentiate for groups with widely disparate needs. It found that an intermediate level of digital competency is required to access programme schedules, enrol in sessions and join virtual programmes. This means that seniors with basic proficiency may be excluded because they may not be aware of programmes or able to access them. Furthermore, most programme sessions are taught in a traditional lecture style, with little time given to practical activities. However, participation in programmes was positively praised as beneficial for not only developing digital skills but also for occupying time, engaging the mind, supporting self-efficacy and developing strong social networks.

The study found examples of best practice in the clear structure of each programme session, which included an introduction to prepare learners for the content, the repeated explanation of digital terminology and the availability of uploaded slides or recordings of many sessions for participants to access for further review. One facilitator made learning material available before the session and disseminated handouts for the class, and this should be the standard applied universally. Observations found a range in the competencies of facilitators. Only two were notably strong for best practice, seen in the way they attempted to gauge prior knowledge at the start of sessions, how they engaged, encouraged and motivated participants through personal anecdotes, enthusiasm and questioning, and attempted to provide extra support to those who needed it most. Such good teaching methods should be held as a standard for other facilitators of digital literacy programmes to emulate during staff training.

Finally, research revealed that there is no digital support for seniors beyond either formal instructional sessions or support limited by prescribed parameters (as seen in Digital Ambassador services). Additionally, there is no provision for informal digital groups of senior learners to gather for peer-to-peer support sessions.

This research has identified successes and weaknesses in the NLB's digital literacy programmes and initiatives in meeting the diverse needs of the senior demographic. The following recommendations are made to improve the programmes and initiatives:

1. To ensure that delivery of digital literacy is inclusive, as a matter of priority, digital literacy programmes should:
    a) be developed in collaboration with seniors to fully meet their practical needs and personal interests, and build more comprehensive feedback systems to allow for participants to contribute to regular and ongoing changes and improvements to programmes
    b) expand beyond English as the language of delivery to include Malay, Tamil and Mandarin, therefore better catering to the diverse linguistic backgrounds of the senior population
    c) differentiate better for participants' prior knowledge and digital competencies and offer many more beginner classes in a full range of areas of interest
    d) plan for hands-on activities for practical practice in the majority of programme sessions.

2. Improve the promotion and booking systems of the digital literacy programmes. There need to be multiple more streamlined avenues to view and the ability to book programmes and amend bookings either in person, online or by phone. This would more adequately provide for seniors with mobility issues or who have limited digital proficiency. The back end of the booking system needs to be consistent between all three booking methods and actively updated, so that it is not possible to book a session that has been cancelled, and any changes made to sessions should be managed by a notification system.

3. Provide better ongoing support to senior digital learners by:
   a) hosting regular drop-in clinics for seniors with any digital or technological problem and promote the use of library spaces for informal senior digital peer-to-peer support groups. This would be in addition to the service provided by the Digital Ambassadors
   b) recognising the value of retiree digital volunteers, and utilise their knowledge and skills to jointly plan content and learning objectives with programme providers, manage informal peer support groups and work one-on-one or in small groups with learners in programmes
   c) ensuring that all library staff are aware of digital services and booking procedures in their libraries so that they can effectively support patron enquiries.

6.1 Research Limitations

The limitations of this research must be acknowledged. The NLB leadership declined requests to be interviewed so the researcher had to infer the digital literacy programmes' aims and objectives through analysis of data, interviews with facilitators and observations. Therefore, the accuracy of the research for Objective 1 is fully dependent on the researcher's conclusions based on the available information. Additionally, data on participant attendance numbers and statistics on gender, age and language was not provided, so it was not possible to determine the reach and popularity of the programmes.

Another limitation of this research is that the sample size of interviewees, both facilitators and participants is small, so the results can only be considered indicative. Rather than being randomly selected from a large pool, interviewees volunteered to be interviewed. It should be noted that some participants were reluctant to be interviewed because they were not confident in their English language proficiency. This seemed to narrow the demographic scope of the selection of interviewees, since all of the participants interviewed were English speaking retirees with competent existing literacy skills, and a strong interest in further developing their digital knowledge and supporting peers to develop digital skills. This self-selection bias should be taken into consideration when assessing the results. It is not possible to deduce whether they are a representative sample of participants who attend programmes or if there is a selection bias because they volunteered to be interviewed. Additionally, the researcher felt that more observations of programme sessions that included more hands-on activities would have made the research of best practice more comprehensive.

6.2 Areas for Further Research

For a more comprehensive analysis and evaluation of the NLB's digital literacy programmes and initiatives for seniors, further research should be conducted in collaboration with the NLB. This would allow full access to programme data, programme policies and curriculum development, and staff training can be examined, and the full range of partnerships can be explored. Additionally, to improve the accuracy of the interview findings, the NLB could enable contact with a wider group of facilitators and the researcher

could access a larger sample of digital programme participants and even non-participants in the senior demographic with the use of translators to assist with interviews.

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