Familiarity Breeds Confidence: Creating Effective Digital Literacy Resources for Older Adults

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Abstract: As population ageing is observed globally, and technology continues to expand into most parts of our lives, many older adults face challenges in adapting to a world that they feel unprepared to inhabit — one filled with increasingly intertwined and fast-evolving technologies that have become necessary to fully participate in society. The age-related digital divide, caused by the gaps in access, motivation and skills of many older adults to use digital technologies compared to younger people, is now a significant problem for the wellbeing and independence of older adults and requires urgent solutions. Increasing the digital literacy and confidence of older adults may help reduce this gap. However, effective strategies for improving digital literacy in later life must take into account the needs and preferences of older learners. This paper reports on two pilot studies conducted to create and evaluate prototype digital literacy resources to discover effective forms and content. This work draws from literature, related work, and feedback on our prototypes from older adults in local communities. Our findings indicate that older adults often prefer device and task-specific digital literacy resources in printed form as a familiar medium before progressing to digital learning, and value community involvement in ongoing support for the learning process. Resources that use figure-of-speech based language and informative diagrams can also be beneficial to older adults, particularly when learning novel digital tasks. These preliminary insights also highlight the potential for conflicting requirements from a diverse demographic and the need for further exploration of the topic.

1 INTRODUCTION

The interconnected and rapid expansion of technologies in most sectors has the potential to increase opportunities, open avenues for digital exploration and education, lead to advances in many disciplines, allow for global connections and make our lives more interactive, entertaining and convenient. Many people around the world reap these benefits. However, this digitalisation has also created a divide. Some marginalised groups are unable to take advantage of, or are even actively disadvantaged by, the rapidly expanding and evolving digital landscape, which becomes frustrating and intimidating. This is particularly true for many older adults, who are now facing a significant challenge: learn to adapt to the digital world or be left behind.

Older adults often face significant barriers to achieving the digital literacy required to engage with the digital world. Many have low confidence in their ability to understand and use technology (Berkowsky et al., 2017), a fear of making mistakes they cannot recover from (Sandhu et al., 2013; Atkinson et al., 2016; Köttl et al., 2021), and internalised ageism that colours their perception of their abilities (Zhao et al., 2023; Köttl et al., 2021). As two of the participants in our studies commented,

> "There's always a little confidence thing somewhere...[asking myself] 'am I getting this right?'. Because I don't think I'm very good at it...I was never taught. There's that confidence thing always. Something missing in what I'm doing."

> "Maybe it's my age but I find that being walked through something once, I don't retain it as well now. Whether it has become more complex, I think there's two sides to it. One I think the world has become more complex and dependent on systems and technology and the other is obviously the personal aging thing, where maybe I'm not as quick as I used to be"

These and other barriers, such as socioeconomic status (Hargittai et al., 2019), may reduce older

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adults' motivation for learning, and contribute to the widening 'digital divide', a divide between those who have access to and use of information and communication technologies and those who do not (Van Dijk, 2020). This knowledge and access gap means that older adults often feel anxious and isolated as the world digitalises around them.

An AgeUK briefing from June 2024 found that 1.7 million people in the UK aged 75 and over do not use the internet (AgeUK, 2024). 49% of people over 75, and 37% of people over 65 cannot complete all tasks in the Essential Digital Skills framework[1] created by the Department for Education, which categorises digital skills related to handling information, transacting, communicating and operating online safely and legally. 33% of those over 75 and 13% over 65 do not have the digital skills needed to thrive in a digital society.

These issues are not present in the United Kingdom alone, but represent a global phenomenon (UN-HABITAT, 2021), with a larger gap between developed and developing regions of the world, and Africa facing the largest gap. 27% percent of adults 65 and over in the United States are still offline (Xie et al., 2021). 94%-98% of younger adults aged 18-44 regularly use the internet in Australia, compared to just 51% of those 65 and older (Tyler et al., 2020). In many developed countries, the demographic of people aged 64 and over is the fastest growing group, and yet their use of Information and Communication Technologies trails behind younger demographics (Neves et al., 2013; Xie et al., 2021). It is projected that people over age 60 will outnumber children under age 10 for the first time in history by 2030 (Tyler et al., 2020).

One critical way to decrease loneliness and isolation in older adults related to the rapid digitalisation of day-to-day tasks is through improving their digital literacy. The aim of the studies reported in this paper was to explore effective types and styles of digital literacy resources to help bridge the digital divide and help older adults become more confident in using digital technologies. As one participant noted,

> "The people who need this the most are living right now".

Our objectives were to review the literature on the concepts and related work on digital barriers for older adults, develop customised prototype resources to overcome the barriers, and evaluate their effectiveness through user studies with older adults in the local community. Two small scale user studies were conducted and data from these studies were analysed. Findings from this evaluation suggest that accessible and engaging digital literacy resources are helpful to older adults. However, they also indicate that there is much variation in learning styles and preferences of older adults. Further research and larger studies are required to address the challenge.

The remainder of this paper is organised as follows. Section 2 provides a brief review of related work in the area. Section 3 outlines the methodology adopted for the studies. Section 4 describes the prototype resources produced as part of the work. Section 5 explains the evaluation process and presents the results. Section 6 outlines the limitations of the work. We offer conclusions and recommendations for future work in Section 7.

2 RELATED WORK

The digital divide mentioned earlier can impact both access to and effective use of technology (Riggins and Dewan, 2005). The first level digital divide relates to a lack of access to digital technologies due to factors such as cost and unavailability, while the second level divide relates to factors such as lack of motivation, digital literacy and support, even when the first level divide does not apply (Van Dijk, 2020).

In this paper, we adopt a broad definition of the term digital literacy as literacy in the digital age (Gilster, 1997) – an essential life skill that includes the ability to understand and use digital technologies appropriately, learn new skills, and deal with errors without losing confidence. Digital literacy extends beyond basic technology proficiency, encompassing complex skills such as information literacy and real-time thinking (Eshet-Alkalai, 2012).

Current digital literacy solutions for older adults include one-to-one trainings (Boulton-Lewis et al., 2007)) and peer-to-peer learning (Piercy, 2019). However, obstacles such as anxiety, fear of online dangers, and physical limitations (Steelman et al., 2016; Czaja and Sharit, 2012) remain. Literature shows that older adults prefer a combination of self-regulated and guided learning (Schlomann et al., 2022) and that lessons must be relevant to their needs. Moreover, they prefer to learn in informal, knowledge-sharing environments, which can be beneficial for older adults as it can promote relaxation and collaboration, and reduce feelings of being a burden to family and friends who support them in learning digital skills.

Many technology, public sector and charitable organisations produce digital guidance resources, some of which are aimed at older adults. However, these

[1] https://www.gov.uk/government/publications/essential-digital-skills-framework/essential-digital-skills-framework

resources are not typically customised to the specific needs of older adults, and where in-person support is offered, they do not scale well with demand.

While universal design principles offer guidance on accessible resources (Centre for Excellence in Universal Design, nd), a gap remains in research on tailored, community-integrated digital literacy resources for older adults. This study aims to address this gap by exploring, developing and evaluating prototype customised resources.

Literature suggests that metaphors and figures-of-speech can be beneficial in shaping our mental models when learning new material. Lakoff and Johnson define metaphors as "understanding and experiencing one kind of thing in terms of another" (Lajoff and Johnson, 2003). Experts in educational theory, linguistics and other related fields have suggested "making and remaking reality with our minds" through metaphor is one way people make sense of and learn about their environments (Cook-Sather, 2003). The novelty of our work is in exploring how digital technologies may be explained in terms of familiar concepts and presented in familiar ways that help create useful mental models.

3 METHODOLOGY

The work reported in this paper was conducted over a period of around 3 months. Two sets of digital literacy resources were created based on research on the subject content, the needs of older adults as ascertained from literature and prior work, and general accessibility guidelines. We aimed to create different kinds of resources to illustrate a few possible options for dimensions such as the format of the resource and level of detail.

Two small scale but in depth studies (A and B) were conducted. Ethics permission for both was obtained from the authors' institution. In both cases, participants were recruited through advertisements in local community spaces and personal contacts. We considered anyone 60 years or older as an older adult. We are aware that there are differing thresholds in literature for being considered older. For the purposes of these studies, the 60+ threshold allowed us to recruit participants from a broad range. The surveys and the activities were based on the Essential Digital Skills framework mentioned earlier.

In Study A, a set of digital literacy resources were designed with a focus on simplification, accessibility, device and application specificity, and universal design principles (Centre for Excellence in Universal Design, nd). The resources included a glossary of icons, terms and definitions, and guides for everyday digital tasks. To evaluate the effectiveness of these resources, user studies were conducted with four participants from the local community. Their ages ranged from early sixties to late seventies. There were three women and one man.

The evaluation process involved pre-activity surveys to ascertain initial digital literacy levels, followed by participants reviewing the resources and attempting a digital task. Post-activity surveys and feedback sessions were then conducted to gauge perception of improvements in digital literacy and gather insights on the effectiveness of resources. This approach allowed for both quantitative and qualitative assessment of the impact of the resources on older adults' digital literacy and confidence. However, with the small sample, the quantitative measure is not treated as significant.

Study B was a qualitative study comparing resource and language preferences of seven older adults with ages ranging from early sixties to late eighties. Five participants were from the local area, and two from farther afield. There were three women and four men.

Participants were given prototype resources in different formats, and asked to complete three digital tasks on high-fidelity recreations of several websites using the prototype resources. They were observed as they undertook the tasks, and were then given additional non-task related resources to review. Afterwards, a semi-structured interview was conducted with each participant on their experiences in learning to complete digital tasks, their preferences for digital literacy resources and use of figure-of-speech language. They were also given the opportunity to provide feedback on the additional resources provided.

Thematic analyses of the two sets of responses were conducted to identify patterns and themes in responses to arrive at findings and avenues for further work.

4 DIGITAL LITERACY RESOURCES

The resources developed in Study A consisted of a glossary (a subset shown in Figure 1) and instructional guides (a high level version shown in Figure 2). The glossary provided clear definitions of digital terms and concepts, while the guides offered step-by-step instructions for specific tasks such as putting a smartphone into Airplane mode and sending emails. These were designed with large fonts and simple layouts for accessibility, and were made available in both

printed and digital formats.

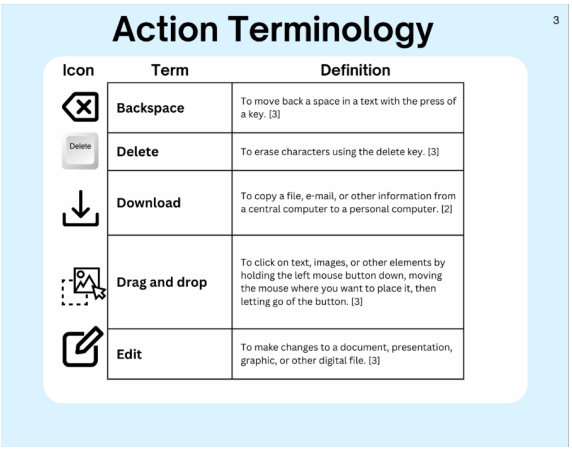

Figure 1: Explanation of action icons.

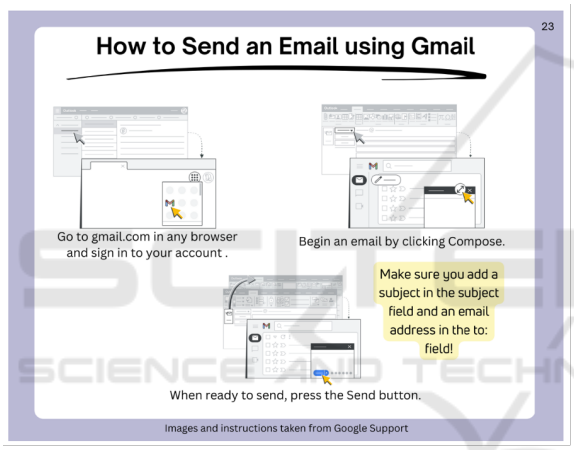

Figure 2: Illustrated instructions for specific software.

The resources developed for Study B comprised one video-based and multiple printed resources with and without figure-of-speech language, illustrations, and demonstration. Three resources were related to specific tasks and additional resources were created for review unrelated to a task. The first resource was a step-by-step resource with minimal text which included no illustrations or figure-of speech language, one resource used illustrations and figure-of-speech explanations alongside step-by-step instruction (one step shown in Figure 3), and one video resource demonstrated the task while also instructing participants on the task using figure-of-speech explanations. The non-task related resources included a reference resource structured as a mind-map providing the names of common platforms used for different internet tasks such as streaming, social media, and searching for information, a text-based "cheat sheet" chart for online safety including information on viruses, and website and email scams, and an internet structure diagram (Figure 4) showing a task, namely sending a photo attachment in an email, in the context of the overall structure of the internet, illustrating the 'journey' of the email as it is sent and received.

Figure 3: Shopping analogy.

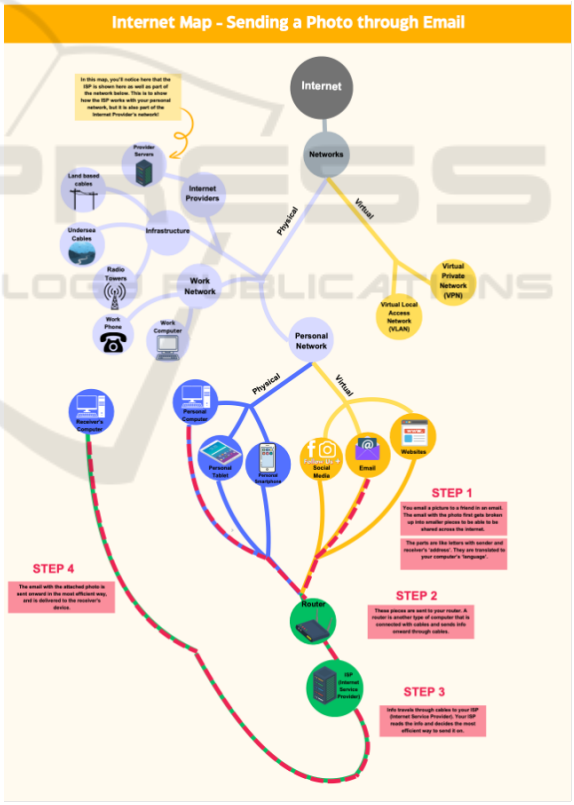

Figure 4: Mental model of email working over the internet.

5 EVALUATION

All user studies were conducted in a one-to-one setting.

The evaluation process for Study A involved pre-activity surveys to assess initial digital literacy, followed by participants reviewing the developed resources and attempting a digital task. Post-activity surveys and feedback sessions were then conducted.

The pre-activity survey gathered data on participants' use of digital services, device ownership, confidence in using digital technologies and challenges faced when doing so. All participants owned smartphones, 3 owned tablets and desktops as well and 2 had laptops. All participants used their devices for email and online shopping, while some had attempted online banking and booking appointments. Participants were very interested in digital technologies, and had engaged with them but also experienced challenges in using them and frustration regarding inadequate support and inaccessible language used.

The post-activity survey attempted to assess the effectiveness of the resources in improving digital literacy, alignment of the resources with preferences and learning styles of older adults and the aspects of the resources that were most helpful and that needed improvements.

Results showed increased motivation among participants to continue learning about digital technologies, with all participants rating the resources as highly clear. Participants also provided valuable feedback, suggesting the need for more device-specific guides and highlighting the importance of community-based training sessions to complement the resources. The importance of a support network was a recurring theme.

The evaluation of resources in Study B were solely qualitative. Participants were observed using and reviewing the resources, and all participants were interviewed using a semi-structured format directly after finishing the three tasks. The tasks involved making a travel booking, online shopping and searching the web using high-fidelity recreations of the real websites using the resources provided. During the process, it was noted that participants who were already familiar with a task tended to ignore the resources until confronted with a problem and that some participants instinctively attempted to book travel to their own destination or look for items they would normally purchase, rather than the values we specified for the tasks. In contrast, one person watched the instructional video all the way through and immediately applied the learning to the task of web search.

The interview questions addressed the challenges participants faced when trying to learn new digital skills, their views on potential solutions to these challenges, preferences among the types of resources provided, and suggestions for other helpful digital literacy resources.

The challenges mentioned by participants included unfamiliar terminology, the need to deal with new devices or updates to existing software and devices, lack of self confidence, memory issues and the volume of information that had to be remembered.

Most participants stated they preferred printed, task-orientated resources that used images and did not have overwhelming amounts of text. Printed materials provided reassurance to participants when they were unsure. As one participant pointed out,

> "I found myself printing off the instructions so I have them to keep. I'm maybe still of the generation that finds some printed material is reassuring...at any point I can refer to a page and it's just that page. I really don't need the whole thing again."

The size of font, use of contrasting colours and visual representations, and pace and level of detail in the instructions were factors that impacted the effectiveness of resources. Participants on the younger end of the age range preferred the video resource, but also liked to use printed resources. Older participants additionally preferred figure-of-speech based resources. No participants found the internet structure diagram resource helpful, although most mentioned it could be useful if they were interested in learning more specifically about the internet. All participants stated they did not care to understand the mechanics of completing digital tasks as long as they could complete steps to accomplish the task.

All participants thought the task-based resources were helpful and clear, with younger participants believing them to be over-explained, and older participants preferring more explanation to less. All participants agreed that clearly and thoroughly explained resources would be helpful regardless of age if they were attempting a novel task.

6 LIMITATIONS

Both studies described in the paper were small scale and mainly, but not solely, focused on one geographic area. Most of our participants owned a smart device and had some experience with digital technologies. Although we attempted to recruit participants through diverse channels, the results are not likely to be representative of a large demographic that is increasing in size and experiencing different levels and extents of

the digital divide. However, even with this small sample, the results are interesting in the differences they highlight.

To minimise any anxiety related to taking part in studies related to digital technologies, participants were asked to provide their own assessment of their digital literacy levels through a survey prior to reviewing our resources and their perception of changes afterwards. These data may not accurately reflect their true digital literacy, confidence and improvements as a result of using the resources.

7 CONCLUSIONS AND FUTURE WORK

Our participants were generally very interested in learning about digital technologies and acknowledged the inevitable move towards a digital-by-default society. One participant said,

> ”It’s omnipresent. You can’t get away from it. It’s part of our daily lives and if you want to participate, you need to manage that information source”

At the same time, there was frustration regarding the inaccessibility of everyday technologies and lack of support. One person explained,

> ”For instance, I couldn’t figure out how to turn the computer back on in my car. It was saying something it never said before, so I had to take out the book to read how to fix it, but I couldn’t go from the book to the screen. I had to take my iPad, look up what it was telling me, and then try to do it on the car app. I couldn’t remember, when I closed the screen, what to do, so I also had to use my phone. It was very confusing, and it took me two and a half hours”

Our current and prior studies (Vaswani et al., 2023; Farag et al., 2024) as well as the literature outlined in Section 2 highlight the need for research in improving the digital literacy and digital inclusion of older adults. An overarching theme of our work is the importance of consistency and the resulting familiarity in facilitating the use of digital technologies and boosting confidence.

Findings from Study A suggest that engaging resources can effectively improve digital literacy among older adults, but customisation and community integration are crucial for success. Key recommendations include developing device-specific guides, implementing community-led training sessions, and offering regular, ongoing support. Future work should focus on expanding the sample size to improve understanding of additional dimensions of accessibility, conducting long-term impact studies to assess retention of digital skills, and collaborating with local organisations to integrate these resources into existing community programs. Additionally, exploring the potential for digital platforms to complement and follow printed materials could enhance the accessibility and reach of these resources, while addressing the evolving needs of older adults in an increasingly digital world.

Study B indicates that most older adults could prefer printed resources that are specific to their needs, with thorough explanations and definitions. Feedback shows that, when creating printed digital literacy resources, the inclusion of diagrams and images, colour-coding, increasing font size and minimising large blocks of text are beneficial. Figure-of-speech based language was found to be helpful, particularly for the oldest participants, and for novel tasks. Resources with structures such as mind maps were thought to be helpful in some digital literacy contexts, but these were limited as participants felt they did not always give enough information. Additionally, care should be taken in creating resources so they are not over-explained, which could make older adults feel ignorant or insulted.

Findings suggest that a mechanism to generate custom resources based on the digital task, resource preferences and skill level of individuals would be beneficial for older adults who struggle to find resources that work well for their needs and fully address their questions. As Study B did not collect any quantitative data, future work is needed to determine the actual efficacy of older adults’ preferred resources, and whether the use of figure-of-speech language decreases error rates, completion times, and increases older adults’ ability to recall and complete the task again without a resource.

Even within these small groups of participants, differences in attitudes, needs and preferences were observed with respect to depth of explanation, format of resources, and means of support. Our findings indicate that there is need and scope for extensive future work, including co-creating instructions and other reference resources with older adults, investigating the implications of language and linguistic features in creating accessible resources, and exploring in depth the potentially conflicting needs of individuals and ways of reconciling them. Scalability and sustainability as applied to digital literacy resources (given the preference for printed material), their dissemination, coordinating support from peers and organisations, and facilitating a transition from famil-

iar printed material to online resources are particular challenges for the future.

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