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# Identifying the Digital Literacy Needs of Adolescents with Intellectual Disabilities: A Focus Group Study

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A B S T R A C T

This study aimed to explore the digital literacy needs, challenges, and support preferences of adolescents with intellectual disabilities to inform inclusive educational practices and policy interventions. A qualitative research design was employed using semi-structured focus group interviews with 20 adolescents aged 13–18 years diagnosed with mild to moderate intellectual disabilities in Taiwan. Participants were recruited through purposive sampling from both inclusive mainstream schools and special education centers. Data collection was conducted through four focus groups, each comprising five participants. The interviews were audio-recorded, transcribed verbatim, and analyzed thematically using NVivo 14 software. Thematic saturation guided the completion of data collection. Trustworthiness was enhanced through triangulated coding, member checking, and maintaining an audit trail. Analysis revealed four overarching themes: (1) access to digital tools and infrastructure, (2) digital skills and usage patterns, (3) social and emotional factors, and (4) support systems and educational strategies. Participants reported limited and unequal access to digital devices, inadequate school resources, and lack of individualized digital instruction. While many adolescents demonstrated basic digital engagement (e.g., opening apps, watching videos), they struggled with more complex tasks such as evaluating online content or engaging in digital communication. Emotional barriers included fear of making mistakes and social comparison with peers. Support from family members and peers emerged as critical, while participants emphasized a need for gamified, visual, and hands-on digital training tailored to their learning styles. Adolescents with intellectual disabilities experience significant barriers to digital inclusion, stemming from infrastructural, cognitive, emotional, and instructional gaps. Addressing these challenges requires context-sensitive, learner-centered interventions and greater collaboration among educators, families, and policymakers to ensure equitable access to digital literacy education.

***Keywords:*** *Intellectual disability; digital literacy; adolescents; focus group; inclusive education; digital inclusion; qualitative research.*

## 1. Introduction

The digital age has transformed the landscape of learning, communication, and daily living for adolescents across the globe. Yet, adolescents with intellectual disabilities (ID) remain among the most digitally excluded populations due to systemic, cognitive, social, and educational barriers that constrain their digital engagement and skill development. Digital literacy is not only critical for accessing information and services, but also for fostering autonomy, social inclusion, and self-efficacy—key developmental goals for youth with intellectual disabilities (Assainova & Anuar, 2025; Mills, 2025; Park, 2025). As digital environments continue to influence education and social interaction, understanding the digital literacy needs of adolescents with ID becomes imperative for equitable participation in the 21st century.

Intellectual disability is characterized by significant limitations in intellectual functioning and adaptive behavior that originate before the age of 18. These limitations affect a person's conceptual, social, and practical skills (Cheon & Kim, 2021). While technological advancements offer new opportunities for inclusive learning, adolescents with ID often face compounded barriers such as limited access to devices, a lack of tailored instruction, and low expectations from educators and caregivers (Georgoula et al., 2025; Malapela & Thupayagale-Tshweneagae, 2022). Recent studies highlight that despite interest in digital technology, youth with ID encounter substantial challenges in acquiring basic digital competencies, understanding online safety, and independently navigating digital platforms (Belimova et al., 2024; Cao, 2024).

The exclusion of adolescents with ID from the digital world is not merely a technical issue but also a reflection of broader social and educational inequities. Research shows that the availability of assistive technologies and personalized teaching strategies significantly influences the development of digital skills in this population (Assainova & Anuar, 2025; Chauke et al., 2021). Unfortunately, such supports are inconsistently implemented across school systems, particularly in contexts with limited resources or rigid curricula. Educators often lack specialized training to effectively support digital learning for students with ID, which further widens the digital gap (Lo & Joyce, 2022; Marrus et al., 2022). Inadequate infrastructure and curriculum design can result in disengagement, underachievement, and digital dependency on caregivers or peers.

Furthermore, the digital inclusion of adolescents with ID is shaped by various personal and interpersonal factors. Emotional readiness, self-efficacy, and prior experience with technology greatly influence their willingness to engage with digital tools (Elgiar et al., 2022; Park, 2025). Adolescents with ID are particularly vulnerable to fear of failure, online exploitation, or social comparison, all of which can hinder their ability to explore and benefit from digital environments (Jeyachandran et al., 2022; Niculae, 2024). For example, exposure to negative online experiences or lack of understanding about digital privacy may cause distress or withdrawal from digital activities (Emerson et al., 2023; Volkova, 2024). Emotional and behavioral regulation—often impaired in individuals with ID—also intersects with their digital learning and communication practices (Hidayat et al., 2021; Vovchenko, 2021).

In addition, the social ecosystem surrounding adolescents with ID—particularly caregivers and educators—plays a crucial role in shaping their digital engagement. Parental support has been identified as both an enabler and a constraint: while some parents actively encourage digital use, others impose strict restrictions due to safety concerns or perceptions of digital incompetence (Chauke et al., 2021; Lo & Joyce, 2022). Educators often perceive digital instruction as a secondary concern, prioritizing behavior management and basic academic skills (Lapshina et al., 2021; Mills, 2025). This misalignment between environmental expectations and the digital potential of students with ID highlights a pressing need for systemic reform and targeted interventions.

One promising direction in current scholarship involves participatory and user-centered approaches to understanding and meeting the digital needs of youth with disabilities. For instance, online prototyping and adaptive software have shown promise in enhancing digital skill acquisition in adolescents with intellectual and developmental disabilities (Assainova & Anuar, 2025). Likewise, technology-enhanced cognitive training and gamified learning platforms are increasingly recognized as effective tools for motivating and scaffolding digital learning among students with ID (Georgoula et al., 2025). However, to date, most research has focused either on the efficacy of interventions or on general technology access, with limited attention to the lived experiences, preferences, and challenges faced by adolescents with ID in acquiring digital literacy skills within their own educational and social contexts.

Qualitative inquiries—especially those that foreground the voices of youth with ID—are essential for capturing the



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nuanced, contextual, and emotional dimensions of digital literacy development. For example, photo-elicitation and narrative methods have revealed the importance of visual supports and personalized instruction in promoting digital engagement (Mills, 2025; Кучинський, 2023). These studies also emphasize the value of emotional resilience and self-expression in helping adolescents navigate digital tasks and online interactions (Belimova et al., 2024; Elgiar et al., 2022). However, a comprehensive understanding of what digital literacy means to adolescents with ID—what skills they value, what obstacles they face, and how they wish to be supported—remains underexplored.

Cultural and contextual differences further complicate the issue. The majority of existing research has been conducted in Western educational settings, with minimal representation from Asian countries where family dynamics, school structures, and digital access conditions may differ significantly (Jalil-Abkenar, 2023; Park, 2025). In societies where academic success is highly prioritized, digital skills related to communication, creativity, or entertainment may be undervalued in educational planning for students with disabilities. Furthermore, stigma associated with intellectual disability may restrict public discourse around digital inclusion and rights (Cheon & Kim, 2021; Niculae, 2024). These sociocultural dynamics warrant attention in designing inclusive digital literacy interventions.

The present study addresses this critical gap by exploring the digital literacy needs of adolescents with intellectual disabilities through a qualitative focus group study conducted in Taiwan.

## 2. Methods and Materials

### *2.1. Study Design and Participants*

This study employed a qualitative research design using focus group interviews to explore the digital literacy needs of adolescents with intellectual disabilities. The approach was grounded in an interpretivist paradigm, aiming to capture the lived experiences, perceptions, and contextual challenges faced by this population in accessing and utilizing digital technologies. A purposive sampling strategy was used to recruit participants from special education centers and inclusive secondary schools across Taiwan. The inclusion criteria were: (1) adolescents aged 13–18 years formally diagnosed with mild to moderate intellectual disabilities, (2) sufficient verbal communication skills to participate in group discussions, and (3) parental or guardian consent for participation.

A total of 20 participants (10 males and 10 females) were recruited, with representation from urban and rural regions to enhance contextual diversity. Participants were grouped into four focus groups of five individuals each, allowing for manageable discussion dynamics and individual engagement. The sample size was determined based on the principle of theoretical saturation—data collection ceased once no new themes or concepts emerged from the interviews.

### *2.2. Measures*

Data were collected through semi-structured focus group interviews conducted in Mandarin, facilitated by trained researchers with experience in special education and qualitative interviewing. Each session lasted between 60 and 75 minutes and was held in a quiet, accessible environment familiar to the participants, such as their school or community center. A semi-structured interview guide was used to ensure consistency across groups while allowing flexibility to probe emerging topics. Key discussion areas included participants' experiences with using digital devices, perceived barriers and facilitators to digital engagement, preferred learning formats, and aspirations for digital inclusion.

All sessions were audio-recorded with participant assent and caregiver consent. Observational notes were also taken to document non-verbal cues, emotional responses, and group interactions that could enrich data interpretation.

### *2.3. Data Analysis*

Audio recordings were transcribed verbatim and translated into English for analysis, preserving linguistic nuances where culturally significant. Thematic analysis was conducted following Braun and Clarke's six-step approach, encompassing familiarization with data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. NVivo 14 qualitative data analysis software was utilized to organize, manage, and code the data systematically.

To enhance the credibility and trustworthiness of the analysis, coding was conducted independently by two researchers, followed by iterative consensus meetings to reconcile discrepancies and refine the thematic framework. Member checking was employed with selected participants' caregivers to validate interpretive accuracy. Additionally, an audit trail was maintained to document analytic decisions and ensure methodological transparency.



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## 3. Findings and Results

A total of 20 adolescents with intellectual disabilities participated in the study. The sample included 11 males (55%) and 9 females (45%), ranging in age from 13 to 18 years (M = 15.4, SD = 1.6). Regarding the level of intellectual disability, 14 participants (70%) were diagnosed with mild intellectual disability, and 6 participants (30%) with moderate intellectual disability, based on medical documentation provided by their educational institutions. Participants were recruited from various special education centers (n = 12, 60%) and inclusive mainstream schools (n = 8, 40%) across urban and rural areas of Taiwan. All participants were currently enrolled in formal education and had at least minimal verbal communication skills, enabling them to actively contribute to group discussions. Additionally, 16 participants (80%) reported having some prior experience using digital devices (e.g., smartphones, tablets, or computers), whereas 4 participants (20%) had little to no independent access to digital tools. All participants engaged in at least one focus group session, and none withdrew during the study.

**Table 1**

*Themes, Subthemes, and Concepts Identified from Focus Group Interviews*

| Category (Theme) | Subcategory (Subtheme) | Concepts (Open Codes) |
|---|---|---|
| 1. Access to Digital Tools and Infrastructure | 1.1 Limited Device Availability | No personal device; Shared family phone; Old tablet model; No internet at home; Low connectivity at school |
| | 1.2 Accessibility Challenges | Difficulty using touch screens; Small font issues; Unintuitive icons; Missing assistive features; Overreliance on caregivers |
| | 1.3 Inadequate School Resources | Few computer classes; Lack of special ed tech tools; Inaccessible learning apps; No classroom Wi-Fi |
| | 1.4 Financial Constraints | Parents cannot afford gadgets; Prioritize essentials over tech; Lack of subsidies; Dependence on hand-me-downs |
| | 1.5 Lack of Individualized Support | One-size-fits-all devices; No tailored instruction; Teachers unaware of specific needs; Lack of tech support staff |
| 2. Digital Skills and Usage Patterns | 2.1 Basic Operational Skills | Turning device on/off; Opening apps; Typing slowly; Copy-paste difficulty; Navigating menus; Reading notifications |
| | 2.2 Content Creation and Interaction | Taking photos; Sending voice messages; Using emojis; Posting on social media; Recording short videos; Commenting on friends' posts |
| | 2.3 Limited Search and Evaluation Skills | Typing unclear keywords; Clicking irrelevant links; Believing all information; Unable to distinguish ads from real content |
| | 2.4 Communication Challenges | Delayed response; Fear of texting wrong thing; Avoid group chats; Difficulty understanding sarcasm; Prefer face-to-face |
| | 2.5 Learning Tool Usage | Watching YouTube tutorials; Using dictionary apps; Educational games; Asking help for homework search; Copying teacher notes from pictures |
| 3. Social and Emotional Factors | 3.1 Fear and Anxiety about Technology | Afraid of pressing wrong button; Worried about being scammed; Fear of online bullying; Nervous using new apps |
| | 3.2 Motivation and Interest | Likes gaming apps; Excited by videos; Curious about tech; Wants to be like peers; Uses tech as a reward |
| | 3.3 Social Comparison and Exclusion | Friends post better pictures; Feels behind others; Excluded from group chats; Envy of others' devices |
| | 3.4 Parental and Teacher Attitudes | Parents don't trust internet; Teachers avoid digital tasks; Strict screen-time rules; Little encouragement |
| | 3.5 Confidence and Self-Efficacy | Proud of sending message alone; Feels smart when using device; Gains independence; Hesitant to ask for help |
| 4. Support Systems and Educational Strategies | 4.1 Role of Caregivers and Family | Siblings teach new apps; Parents set up passwords; Help when stuck; Family controls access; Encouragement from mother |
| | 4.2 Role of Teachers and Schools | Teacher avoids digital tools; Some teachers provide printed guides; No structured curriculum; Some after-school clubs |
| | 4.3 Need for Tailored Training | Wants simple step-by-step instructions; Needs repeated practice; Prefers video-based lessons; Likes interactive visuals; Prefers learning by doing |
| | 4.4 Peer Support and Modeling | Follows friend's example; Peers explain apps; Watches classmates; Imitates older siblings |
| | 4.5 Suggested Program Features | Use of cartoons; Gamified content; Repeat button for instructions; Progress tracking; Parental dashboard; Real-life scenarios |
| | 4.6 Barriers to Ongoing Training | Forget skills quickly; No follow-up classes; Inconsistent routines; Caregiver unavailability; No home practice opportunities |



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**Category 1: Access to Digital Tools and Infrastructure**

**1.1 Limited Device Availability**: Many adolescents reported restricted access to digital devices, often relying on outdated or shared tools within their households. Most participants used devices belonging to family members, which limited their time and independence. One student noted, *"I can only use the phone when my brother is done with his games. Sometimes it's already bedtime by then."* Others mentioned that their schools had no dedicated devices for students with intellectual disabilities, making it difficult to engage in regular practice.

**1.2 Accessibility Challenges**: Participants shared struggles with physical and cognitive access to digital technologies. Some had difficulty using touch screens due to fine motor limitations or could not read small text sizes. One adolescent expressed, *"The letters are too tiny, and I press the wrong thing all the time."* Others reported confusion with symbols and a lack of intuitive features in most apps. Assistive technologies were notably absent or unknown.

**1.3 Inadequate School Resources**: Students described their school environments as under-resourced when it came to digital learning. Access to Wi-Fi was inconsistent, and computer labs were either nonfunctional or reserved for general education students. One participant stated, *"We have computers in school, but we're not allowed to use them. Only the regular class can."*

**1.4 Financial Constraints**: Economic limitations were a recurring barrier across the focus groups. Families often prioritized essentials over digital tools, and students expressed awareness of their family's financial strain. As one participant explained, *"My mom says we can't buy a tablet because food comes first."* Others used old or hand-me-down devices that were no longer compatible with current apps or systems.

**1.5 Lack of Individualized Support**: Participants shared that their digital learning experiences were rarely tailored to their abilities. Devices and instruction often followed a one-size-fits-all model. One adolescent noted, *"They just tell us all to do the same thing, but I get confused faster."* The absence of tech support staff or specialized digital instruction left students feeling unsupported and overwhelmed.

**Category 2: Digital Skills and Usage Patterns**

**2.1 Basic Operational Skills**: While most students could turn on devices and open apps, they struggled with more nuanced operations like navigating menus or adjusting settings. Some couldn't type efficiently or hesitated with copy-paste commands. A participant shared, *"I can open YouTube, but I don't know how to go back when I press the wrong thing."*

**2.2 Content Creation and Interaction**: Despite difficulties, many adolescents enjoyed creating and interacting with content online. They used emojis, took selfies, and recorded short videos for social media. However, their engagement remained limited to very basic features. One adolescent stated, *"I like sending voice messages because I don't need to write."*

**2.3 Limited Search and Evaluation Skills**: Most participants had difficulty searching for reliable information or evaluating online content. They often clicked on the first result, regardless of accuracy. One remarked, *"I just pick the first thing that comes up. I don't know which one is good or bad."* Many believed that all online content was trustworthy.

**2.4 Communication Challenges**: Digital communication posed several challenges. Students hesitated to text peers or join group chats due to fear of mistakes or misunderstanding tone. As one student described, *"I don't reply fast because I'm scared they'll laugh if I write something wrong."* Others avoided chats altogether, preferring in-person interaction.

**2.5 Learning Tool Usage**: Some adolescents used digital tools to support their learning, including watching educational videos or using apps for homework help. They often relied on caregivers or teachers to guide them in finding the right resources. One participant shared, *"I don't know which video is good for homework, so my mom helps me search."*

**Category 3: Social and Emotional Factors**

**3.1 Fear and Anxiety about Technology**: A strong theme was the fear of technology use, stemming from past mistakes or unfamiliarity. Several participants worried about being hacked or accidentally deleting something important. *"What if I press the wrong button and break it?"* one participant asked anxiously. This fear often deterred them from exploring new apps or websites.

**3.2 Motivation and Interest**: Conversely, many participants expressed genuine curiosity and excitement toward technology, especially entertainment content like games and videos. A student enthusiastically noted, *"I love watching videos with dogs and games—it makes me happy."* They often viewed tech use as a reward or recreational escape.

**3.3 Social Comparison and Exclusion**: Participants compared their tech use and access with that of their peers, often feeling left out or inferior. This led to a sense of digital exclusion. One adolescent said, *"My friends have iPhones*



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*and cool apps. I only watch what they send me."* Others reported being excluded from group chats or online games.

**3.4 Parental and Teacher Attitudes**: The role of adults was seen as both a support and a barrier. Many parents were described as skeptical or fearful of digital risks. One participant shared, *"My dad says the internet is dangerous and not for me."* Teachers, too, were often hesitant to incorporate technology in special education settings, citing time and complexity.

**3.5 Confidence and Self-Efficacy**: Confidence varied widely among participants. Some felt proud of small technological accomplishments, while others expressed low self-efficacy. *"I sent a message by myself, and my mom was so happy,"* shared one student. However, many were still hesitant to try new tools without external reassurance.

**Category 4: Support Systems and Educational Strategies**

**4.1 Role of Caregivers and Family**: Family members played a critical role in mediating digital engagement. Siblings were often informal teachers, and parents managed security settings. *"My sister shows me how to use Instagram,"* said one participant. However, reliance on family members limited the adolescents' independent use.

**4.2 Role of Teachers and Schools**: Educators were inconsistent in their use of technology. Some provided handouts or avoided digital tools entirely, while others facilitated structured exposure. *"Only one teacher gives us worksheets from Google,"* mentioned a participant. Many adolescents expressed a desire for more interactive tech use in class.

**4.3 Need for Tailored Training**: Participants repeatedly emphasized the need for step-by-step, simplified training programs designed for their learning style. They favored video-based, gamified, and visually rich formats. One adolescent shared, *"I learn better with pictures and videos, not too many words."* Repetition and hands-on practice were highlighted as key.

**4.4 Peer Support and Modeling**: Peer interactions significantly influenced digital learning. Students mimicked classmates' behaviors, asked for help, or followed peers' examples. One said, *"I watch what my friend does and then I try the same."* This modeling often filled gaps left by absent formal instruction.

**4.5 Suggested Program Features**: When asked what kind of digital literacy programs they preferred, participants favored gamified formats with familiar characters and real-life scenarios. *"Make it like a game, with prizes and cartoon teachers,"* one adolescent suggested. Others requested the ability to repeat instructions and monitor progress visually.

**4.6 Barriers to Ongoing Training**: Despite initial interest, sustaining digital learning proved difficult. Participants often forgot what they learned, lacked consistent training, or had no home support. As one participant noted, *"I forget fast when no one reminds me."* This highlighted the need for routine and reinforcement beyond the classroom.

## 4. Discussion and Conclusion

This study explored the digital literacy needs of adolescents with intellectual disabilities (ID) in Taiwan using qualitative focus group interviews. The findings revealed four primary themes: (1) access to digital tools and infrastructure, (2) digital skills and usage patterns, (3) social and emotional factors, and (4) support systems and educational strategies. These themes collectively highlight that while adolescents with ID demonstrate curiosity and partial engagement with digital technologies, they face multiple intersecting barriers that limit their full digital inclusion. The results reflect broader structural and pedagogical challenges and align with recent research on digital marginalization and special education technology needs.

A major finding of this study was the restricted access adolescents with ID had to digital devices, internet connectivity, and assistive technologies. Most participants relied on shared or outdated devices, lacked consistent access at school, and reported a dearth of supportive infrastructure. This finding resonates with prior research indicating that infrastructural limitations and socio-economic factors substantially hinder the digital engagement of youth with intellectual and developmental disabilities (Assainova & Anuar, 2025; Malapela & Thupayagale-Tshweneagae, 2022). While some global contexts have seen improvements in digital access through national policies or assistive tech programs, equitable distribution remains uneven, particularly for adolescents in special education settings (Mills, 2025). Furthermore, the inaccessibility of device interfaces—such as small fonts, non-intuitive icons, and lack of adaptive features—compounds difficulties for learners with cognitive and perceptual processing challenges (Belimova et al., 2024). The result is a persistent digital divide that not only limits participation in digital learning but also deepens social exclusion.



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Another key theme was the fragmented and underdeveloped digital skill sets observed among the participants. While many adolescents had basic operational skills—such as opening apps or typing short messages—their digital engagement was primarily limited to entertainment or passive consumption, with little involvement in more cognitively demanding tasks such as information search, content evaluation, or digital collaboration. These findings are consistent with studies emphasizing that adolescents with ID often experience uneven digital skill acquisition due to the absence of structured training and cognitive scaffolding (Georgoula et al., 2025; Park, 2025). In particular, their inability to distinguish between credible and misleading content, their overreliance on caregivers for digital navigation, and their avoidance of group chats or online forums due to fear of judgment mirror the patterns observed in other vulnerable groups (Cao, 2024; Jeyachandran et al., 2022). Moreover, the tendency of educators to prioritize traditional literacy over digital competencies for students with ID may contribute to these skill gaps (Lapshina et al., 2021; Lo & Joyce, 2022).

Emotional and psychological factors emerged as important mediators of digital engagement. Participants expressed anxiety about using technology, fear of failure, and concerns about online safety. These concerns frequently discouraged them from exploring new platforms or communicating digitally. Similar emotional responses have been observed in adolescents with ID who experience heightened vulnerability to cyberbullying, social exclusion, and performance anxiety (Niculae, 2024; Volkova, 2024). Adolescents' narratives also reflected a sense of inferiority and social comparison, particularly when discussing the technological skills or devices possessed by their typically developing peers. This aligns with research showing that adolescents with ID often internalize stigmas around their competence, leading to diminished self-confidence and avoidance behaviors (Cheon & Kim, 2021; Emerson et al., 2023). However, it is also important to note that some participants expressed pride in their small accomplishments, suggesting that supportive digital experiences could bolster self-efficacy and emotional well-being (Marrus et al., 2022; Кучинський, 2023).

The role of support systems—particularly families, peers, and educators—was another crucial theme. Adolescents heavily depended on siblings, parents, and friends to learn how to use devices and navigate digital spaces. These findings affirm that digital literacy for adolescents with ID is inherently relational and contingent upon the presence of knowledgeable, patient, and emotionally supportive social actors (Chauke et al., 2021; Jalil-Abkenar, 2023). At the same time, the study found that parents were sometimes overly restrictive due to concerns about online risks, and that teachers often lacked confidence or training in digital instruction for students with special needs. This is consistent with prior literature indicating that educators and caregivers frequently act as gatekeepers rather than facilitators of digital inclusion for individuals with ID (Lo & Joyce, 2022; Mills, 2025). Moreover, while peer modeling emerged as a powerful informal learning tool, it was underutilized due to limited structured peer-interaction opportunities in schools (Malapela & Thupayagale-Tshweneagae, 2022).

Participants in this study also expressed specific preferences for digital literacy training, emphasizing gamification, visual instruction, and hands-on practice. These preferences reflect cognitive and motivational profiles that are well-documented in research on digital learning for individuals with ID (Assainova & Anuar, 2025; Georgoula et al., 2025). Prior studies suggest that digital instruction is most effective when it incorporates simple navigation, consistent feedback, repetition, and multimedia supports tailored to developmental levels (Elgiar et al., 2022; Hidayat et al., 2021). Additionally, participants suggested incorporating real-life scenarios into digital tasks, further highlighting the need for practical relevance in instructional design. Despite this enthusiasm, many adolescents noted that training was inconsistent and easily forgotten, pointing to a lack of sustained programming and follow-up support (Cao, 2024; Lapshina et al., 2021).

Overall, the findings underscore that digital literacy for adolescents with ID cannot be reduced to technical skills alone; rather, it is a complex construct shaped by emotional readiness, social environments, cultural attitudes, and pedagogical design. The experiences shared by Taiwanese adolescents in this study mirror many of the patterns observed globally, yet also suggest context-specific features such as familial involvement and rigid schooling structures that may mediate digital access differently than in Western contexts (Park, 2025; Vovchenko, 2021). This highlights the importance of culturally grounded interventions that are attuned to the lived realities of adolescents with intellectual disabilities and their ecosystems.

While this study provides in-depth insights into the digital literacy needs of adolescents with intellectual disabilities, several limitations should be acknowledged. First, the sample was limited to a relatively small group of adolescents



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in Taiwan, which may limit the generalizability of findings to other cultural or regional contexts. Second, although participants had verbal communication skills, the group excluded non-verbal individuals with ID, whose digital experiences may differ substantially. Third, the focus group format, while rich in interactional data, may have influenced participants' willingness to speak openly due to peer presence. Finally, while theoretical saturation was achieved, the perspectives of caregivers, teachers, and therapists were not directly included in this phase of the study.

Future research should expand the demographic and geographic diversity of participants to explore how cultural, socioeconomic, and educational systems shape the digital inclusion of adolescents with ID in varied contexts. Including non-verbal or minimally verbal adolescents through visual elicitation or assistive communication technologies may reveal unique needs and challenges. Longitudinal designs would also be valuable in tracking digital skill development over time and evaluating the long-term effectiveness of specific interventions. Moreover, future studies should integrate perspectives from caregivers, educators, and allied professionals to triangulate findings and co-design inclusive digital literacy programs. Mixed-methods approaches that combine qualitative insights with digital proficiency assessments may also enhance the validity and applicability of findings.

To bridge the digital divide for adolescents with intellectual disabilities, schools and community programs must prioritize the integration of tailored digital literacy training within special education curricula. Educators should receive targeted professional development on digital pedagogy and adaptive technologies. Families should be engaged as collaborative partners, receiving guidance on how to support safe and empowering digital use at home. Training materials should be visual, interactive, and grounded in real-world tasks to promote retention and relevance. Finally, policies must address infrastructural disparities and ensure that adolescents with ID have consistent, equitable access to up-to-date digital tools and resources.

## Authors' Contributions

Authors contributed equally to this article.

## Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

## Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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## Declaration of Interest

The authors report no conflict of interest.

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## Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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