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A Literature Review of Adolescent Internet Literacy from the Perspective of Digital Divide

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Abstract

In the information age, Internet literacy encompasses computer literacy, information literacy, and other literacy content, including network technology, network security, and other aspects. It is the basic literacy necessary for the survival and development of adolescents on the network. Adolescents, as Internet natives, are vulnerable to the influence of the Internet, so improving their Internet literacy is critical. This study reviews the literature on adolescent Internet literacy from three aspects, including the concept of internet literacy, evaluation indicators of adolescents' internet literacy, and its relationship to other factors, to help better understand the focus of the previous studies and make suggestions for future research directions. At the same time, it is hoped that this will draw the attention of researchers to the importance of Internet literacy, and advocate that policymakers, schools, and parents commit themselves to guiding adolescents to use the Internet wisely, improving their Internet literacy, and contributing to the narrowing of the digital divide.

Keywords

Literacy Divide; Internet Literacy; Adolescent; Evaluation Methods; Influencing Factors.

1. Introduction

In the era of informatization and digitalization, digital technologies such as the Internet, cloud computing, and artificial intelligence have deeply intervened in and affected all aspects of human life. The actions of individuals have been greatly impacted. While digital technology has improved people's productive lives and increased their access to knowledge, it has also resulted in a more serious digital divide issue. For example, the gap between rural or remote areas and urban areas in terms of Internet access due to inadequate Internet infrastructure, and the digital divide resulting from the different abilities of people of various ages to use the Internet. When the scholarship on the digital divide first began to emerge, most of the literature focused on the differences between the haves and have-nots in the digital age, and the concept of the digital divide at that time was considered to be a binary division between people who had access to computers and the Internet and those who didn't (Van Dijk,2006). Following the Internet's rise in popularity, the issue of physical access to the network was resolved, enabling most people to utilize computers, the Internet, and other digital technologies. However, disparities in how people use and are skilled with information technology have increasingly caught the attention of scholars, who are now proposing "beyond access" and redefining the digital divide. Dewan and Riggins (2005) have examined the first-order consequences of the digital gap in terms of who has access to technology at three levels: individual, organizational, and global, as well as the second-order effects of the digital divide in terms of disparity in the ability to use technology. Van Dijk and Hacker's (2003) study suggests that inequalities in the acquisition and application of skills are expected to expand, predicts a widening of the utilization gap, and finds that the utilization gap is related to the development of the

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information society and the networked society. Hargittai (2002) suggests examining variations in people's abilities to locate information online. After gaining physical access, people must acquire and apply digital media skills, which some scholars call Internet literacy. However, more important than acquiring relevant Internet skills is having the ability to search for information, communicate, and produce content (Van Dijk,2017). This study focuses on the literacy divide among adolescents. The disparities in people's information abilities and use are called the "literacy divide" in this paper. During the recent coronavirus outbreak, adolescents were forced to rely on the Internet to access online learning. While there are benefits to using the Internet for education, such as easy accessibility and flexibility in helping students learn new material at home and repeatedly, there are drawbacks to the acceptance of online courses due to varying levels of Internet literacy. Students who are more proficient in using the Internet will also have a better online experience. Furthermore, as current Internet natives, adolescents' thinking and conduct are heavily influenced by the Internet, and possible issues such as Internet security, Internet addiction, privacy breaches, and cyberbullying expose adolescents to significant risks on the Internet. The level of Internet literacy among adolescents is not only related to their own growth and development but also to closing the literacy divide. It is important to assess the level of Internet literacy among adolescents and investigate the factors affecting their Internet literacy to find ways to close the divide in adolescents' literacy at its source.

In earlier research, academics have attempted to define Internet literacy from many areas and evaluated adolescents' Internet literacy by creating scales and questionnaires that divide Internet literacy into several categories. Other researchers have explored the relationship between adolescents' Internet literacy and demographic, family, and school factors. This paper aims to raise awareness of the concept of Internet literacy, particularly concerning the Internet literacy of adolescents, and to sort out the connections between Internet literacy and media, computer, information, and digital literacy by gathering and organizing prior research on the subject. This will give future scholars a starting point for their exploration of the meaning and scope of Internet literacy, as well as the relationships between various forms of literacy. To disclose the methodologies employed in existing research to assess the level of Internet literacy among adolescents and the delineation of the main dimensions to propose improvements in future evaluation methods. Additionally, this paper investigates the variables that may have an impact on adolescents' Internet literacy and offers guidance to researchers on how to improve the study by including adolescents' online literacy as an independent variable.

2. The Definition of Internet Literacy

As previously indicated, academics have focused a great deal of attention on the disparities in information skills and use, sometimes known as the literacy divide, and an increasing number of studies are addressing Internet literacy. The network era has more comprehensive requirements for an individual's core literacy than traditional literacy, which was based on the gradual emergence of concepts such as computer literacy, media literacy, information literacy, digital literacy, and others. The concept of Internet literacy followed these concepts, and it is important to note that there are differences and links between these concepts to fully explore the concept of Internet literacy.

2.1. Computer Literacy

As an extension of traditional literacy, computer literacy concentrates on the abilities required to use a variety of computer programs, including word processing, databases, spreadsheet creation, and other programs, in addition to some other general computer skills (McClure,1994). Subsequent scholars have contended that computer literacy encompasses more than just basic computer skills; for instance, Ovens (1991) notes that computer literacy is

ISSN: 2688-9323

becoming more and more significant in libraries, where the proliferation of computerized information and storage media, along with the explosion of information, have made computerized information storage and retrieval the only practical means of efficiently accessing large amounts of material.

2.2. Media Literacy

Before the emergence of the Internet, media literacy primarily referred to traditional media such as books, newspapers, and magazines. People live in a media world dominated by traditional media. The rapid growth of network technology causes the Internet to rapidly enter into people's daily lives, and the Internet emerges as a new type of media, eventually becoming the mainstream of new media. As a result, existing research on media literacy must be used to inform Internet literacy studies. Subsequently introducing the concept of media literacy, Aufderheide and Firestone (1993), in the report of the National Leadership Conference on the theme, proposed media literacy as a movement that extends the concept of literacy to include the powerful post-print media that dominate our information landscape, which helps people to understand, produce, and negotiate meanings in a culture comprised of powerful images, words, and sounds, and argued that a media literate person can decode, evaluate, analyze, and produce print and electronic media. The Center for the Study of Media Literacy in the U.S. proposed the widely accepted definition of media literacy, which states that it is the capacity people exhibit when confronted with a wide range of messages in various media to choose, comprehend, question, evaluate, create, and produce information as well as respond thoughtfully to it (Vande Berg et al.,2004).

2.3. Information Literacy

The concept of information literacy was first put forward by Zurkowski, president of the American Information Industry Association, in 1974. He believes that information literacy is the technology and skills to use a large number of information tools and main information resources to solve problems (Zurkowski,1974). After the concept of information literacy was put forward, it has been widely disseminated and used in the world, and many organizations have put forward the definition of information literacy from different angles. In 1989, the American Library Association (ALA) stated that people with information literacy must be able to access, evaluate, and use the information they need effectively. After noting that information literacy must deal with information in any format, including print and electronic formats, McClure (1994) positions it at the intersection of traditional literacy, computer literacy, media literacy, and network literacy, and places it within a broader set of information resolution skills.

2.4. Digital Literacy

The term digital literacy was first coined by Gilster in 1997 and refers to the ability to understand and use information in multiple formats from a variety of sources as it is presented through a computer (Gilster,1997). Soon after, scholar Pool proposed a new definition of digital literacy, believing that digital literacy refers to the ability to adapt to new media (Pool,1997). In 2004, Eshet-Alkalai proposed that digital literacy is a survival skill, involving various complex cognitive, motor, sociological, and emotional skills, users need to function effectively in the digital environment, and pointed out that digital literacy includes five aspects, namely picture literacy, innovation literacy, branch literacy, information literacy and social-emotional literacy (Eshet-Alkalai,2004). With further research, the European Union defines digital literacy as the ability to use information technology responsibly, critically, and innovatively for work, employment, learning, leisure, and social participation (Punie et al.,2015).

ISSN: 2688-9323

2.5. Internet Literacy

American researcher Charles R. McClure originally proposed the idea of Internet literacy in 1994. According to him, information problem-solving skills are comprised of computer literacy, media literacy, information literacy, and traditional reading and writing skills. He also views Internet literacy as the capacity to identify, access, and use electronic information in information networks (McClure,1994). Ever since McClure's Internet literacy proposal, the term has generated debate among the academic community, although ongoing research has gradually improved the definition of Internet literacy. Savolainen (2002) proposed the concept of cyber competence based on McClure's definition of Internet literacy and summarized the basic requirements for cyber competence in information seeking as four competencies: awareness of networked information resources and their organization, proficiency in the use of ICT tools for accessing information, judging the relevance of information, and the use of communication tools. The ability to access, analyze, evaluate, and generate online content is just one aspect of Internet literacy, according to Livingstone, another British researcher who came after (Livingstone & Helsper,2010). Kim and Yang propose that Internet literacy includes the ability of Internet users to search, collect, understand, and evaluate information for specific needs or purposes (Kim & Yang,2016). Bauer and Ahooei (2018) argue that in addition to its definition of Internet literacy, there is a set of synthetic concepts that are a combination of 'literacy' and other concepts derived from the field of media and the Internet, including media literacy, computer literacy, technology literacy, cyberliteracy, digital literacy, web literacy, network literacy, e-literacy, information literacy, data literacy, and social media literacy which their components and standards are also applicable to Internet literacy.

To sum up, different scholars have different descriptions of the definitions of each literacy, and no unified definition has been formed. To more clearly show the difference between Internet literacy and other literacy, this paper defines computer literacy as the computer knowledge and skills that a person must possess. Media literacy refers to different levels of abilities that should be possessed at various stages related to media application, including acquisition, analysis, evaluation, creation, and participation. Information literacy mainly emphasizes the ability to collect, identify and effectively use information. Digital literacy focuses on digital information, focusing on the ability to access, communicate, innovate, and critically use information using digital tools. There are some similarities between Internet literacy and other literacy. At the same time, there are some differences due to different social backgrounds and use scenarios. As a new medium in the digital age, Internet literacy is most closely related to media literacy. However, Internet literacy has the largest breadth and includes more different characteristics. As a result, this study asserts that Internet literacy is a conceptual collection of computer literacy, media literacy, information literacy, and digital literacy, with a focus on how to recognize, use, and manage networks. Adolescent Internet literacy emphasizes that adolescents should have the necessary skills for the above series of literacy, such as using digital tools and digital technologies to obtain information, communicate, evaluate, use, and innovate, as well as critical thinking, staying alert to negative information on the Internet, and understanding basic network ethics and network security.

3. The Approaches to Gauge Adolescents' Internet Literacy

The evaluation indicators of Internet literacy have progressively expanded from a single technical level to a comprehensive ability level with numerous dimensions in tandem with the ongoing improvement of the notion of Internet literacy.

The first Internet literacy assessment that was proposed included two dimensions: knowledge and skill. The knowledge dimension is primarily used to assess an individual's comprehension of the process and extent of accessing network information as well as their proficiency in using

ISSN: 2688-9323

it, while the skill dimension is primarily used to assess an individual's capacity to process network information and to make use of the network to further their personal development (McClure,1994). Other researchers have measured adolescents' Internet literacy as a composite scale of proficiency in specific online activities, including abilities related to accessing and evaluating information as well as those related to online communication and interaction (Lee & Chae,2012). Lee (2015) distinguishes Web 1.0 from Web 2.0 and develops an instrument to measure adolescents' new media literacy based on the conceptual framework proposed in previous studies, which is further subdivided into 10 dimensions to more accurately assess new media literacy. Noh (2016) assessed the level of digital literacy among adolescents in terms of three dimensions: technical literacy, bit literacy, and virtual community literacy. Bauer and Ahooei (2018) divided Internet literacy into three parts using the qualitative research methodology of rooted theory: responsibility, productivity, and interactivity. They sought to emphasize not only the technical and informational aspects of Internet literacy but also its diagnostic, practical, behavioral, and ethical aspects.

After reviewing the literature, it was discovered that the most common methods of evaluating Internet literacy now in use are surveys and interviews, with the majority of the surveys involving the creation of questionnaires and assessment scales. Shapiro and Hughes (1996) developed another seven-dimensional scale of college students' online literacy, including tool literacy, resource literacy, social-structural literacy, research literacy, publishing literacy, emergent technology literacy, and critical literacy. Ngulube et al. (2009) employed interviews and questionnaires to assess students' Internet literacy in terms of their understanding of online information sources, how they use search engine tools to get online content, and how reliable they believe the information they get online. Stodt (2016) measured people's subjective assessments of their level of Internet literacy using the recently created Internet Literacy Questionnaire (ILQ), which has four dimensions: self-regulation, generation and interaction, technical proficiency, and reflection and critical analysis. Kim and Yang (2016) created a web literacy questionnaire with two components: web skills literacy and web information literacy. Web skills literacy refers to the basic skills required to use Internet technology, while web information literacy refers to people's ability to filter information to meet specific needs, which usually includes searching, collecting, understanding, and evaluating information. Mıhcı Türker and Kılıç Çakmak (2019) suggested conducting corresponding interviews with small groups of people about their Internet use to obtain the status of students' Internet health awareness in seven areas including cyberbullying, Internet addiction, Internet privacy, and Internet etiquette. Huang et al. (2021) created and validated a new scale to assess the Internet literacy level of Chinese junior high school students, which includes five evaluative dimensions: Internet knowledge and skills, Internet self-management skills, Internet awareness and cognition, and Internet communication and interaction skills.

In conclusion, the evaluation indices of Internet literacy have been enriched by the breadth of research, covering numerous levels and aspects. Second, the design of evaluation scales and self-administered questionnaires is the primary basis for evaluating Internet literacy. While some researchers have examined adolescents' Internet literacy through interviews and small-group tracking records, the evaluation dimensions and indicators included in the current scales and questionnaires are not consistent, and researchers in different fields have differing opinions about how to divide the dimensions.

ISSN: 2688-9323

Table 1. Dimensions of Internet Literacy Evaluation

Author(s)	Dimensions
McClure (1994)	(1) Knowledge (2) Skills
Shapiro and Hughes (1996)	(1) Tool literacy (2) Resource literacy (3) Social-structural literacy (4) Research literacy (5) Publishing literacy (6) Emergent technology literacy Critical literacy
Ngulube et al. (2009)	(1) Rate of use of web-based information resource (2) Skills in navigating the Internet and formulating search queries (3) Criteria used to rate relevance of Internet information resources Use of computer-mediated communication
Lee and Chae (2012)	(1) Accessing and evaluating information (2) Online communication and interaction
Lee et al. (2015)	(1) Consuming skill; (2) Understanding; (3) Analysis; (4) Synthesis; (5) Evaluation; (6) Presuming skill; (7) Distribution; (8) Production; (9) Participation; (10) Creation
Noh (2016)	(1) Technical literacy (2) Bit literacy (3) Virtual community literacy
Stodt (2016)	(1) Technical expertise (2) Reflection and critical analysis (3) Production and interaction (4) Self-regulation
Kim and Yang (2016)	(1) Internet skill literacy: Internet technology (2) Internet information literacy: searching, collecting, understanding and evaluating content
Bauer and Ahooei (2018)	(1) Responsibility: awareness, cognition and application (2) Productivity: evaluation/interpretation, creation and management (4) Interactivity: communication, participation and collaboration
Mıhcı Türker and Kılıç Çakmak (2019)	(1) Internet addiction (2) Cyberbullying (3) Netiquette (4) Online privacy (5) Inappropriate online content (6) Copyright (3) Cyber security
Huang et al. (2021)	(1) Knowledge and skills for the Internet (2) Internet self-management (3) Awareness and cognition of Internet (4) Internet interactions (5) Autonomous learning on the Internet

ISSN: 2688-9323

4. The Factors Affecting Internet Literacy

The influencing factors of Internet literacy are complex and diverse, and existing studies have mainly focused on the influence of individual factors, family factors, school factors, and other aspects of Internet literacy.

4.1. Individual Factors

Regarding demographic variables, scholars have contended that variations in adolescents' age, gender, and educational attainment may affect their Internet literacy. Previous studies have differed in their conclusions in exploring whether age is an important factor in influencing Internet literacy. While the study's results indicate that age does not have a statistically significant impact on Internet literacy, contrary to the beliefs of some experts, age is not a decisive factor in Internet literacy (Monteiro & Leite,2021; Nasah et al.,2010). By evaluating many factors that can have an impact on adolescents' digital literacy skills, other researchers have also discovered that age is not a factor that affects students' digital literacy skills (Sunny & Ramasamy,2024). The systematic relationship between demographic variables, internet access, internet use, cyber skills, and online risks and opportunities for UK adolescents was examined by Livingstone (2010), who defined Internet literacy as online skills and online self-efficacy. The results showed that older middle-class adolescents faced greater online risk but also benefited more from online opportunities than adolescents from working-class backgrounds. Additionally, studies on how gender affects Internet literacy have produced a variety of results. While some academics have discovered that boys are more knowledgeable and skilled with technology than girls (Nguyen & Habók,2022; Ukwoma et al.,2016), other researchers have found that girls are more proficient with ICT and have greater levels of Internet literacy than boys (Aesaert & Braak,2015; Kim et al.,2014). However, some research has found no statistically significant variations between gender and Internet literacy or very minor variances (Morgan et al.,2022; Umar & Jalil,2012). In addition, the researcher found significant differences in Internet literacy between students in different classes and grades (Liao & Chang,2010).

When attempting to investigate whether people who spend more time on social media are more knowledgeable about getting information from the Internet, the study's findings revealed that those who spent more time on social media did not have higher Internet literacy skills when taking into account other individual factors like the amount of time spent online (Len-Ríos et al.,2016). Conversely, it has been proposed that more Internet use is advantageous to youth Internet literacy, implying that Internet use positively predicts Internet literacy, which positively predicts social skills, which in turn positively predicts Internet use (Ye et al.,2018). In addition, self-efficacy has been noted by many researchers to explore the impact of self-efficacy on Internet literacy. Self-efficacy mostly relates to a person's assessment of their ability to carry out a certain behavior or reach a particular goal, which in part reflects their level of confidence. Primary school pupils' ICT competence test scores increased with their ICT self-efficacy, according to a researcher looking into the elements impacting these students' IT proficiency (Aesaert et al.,2015). Similarly, students with higher ICT self-efficacy had better online information processing strategies, and there was a favorable correlation between actual online skills and self-assessed online skills (Hargittai & Shafer,2006; Tsai M.J. & Tsai C.C.,2010).

4.2. Family Factors

Family socioeconomic status, including family income and education level, is an important factor affecting Internet literacy. Relevant research has demonstrated a beneficial relationship between the socioeconomic level of the family and digital, information, and computer literacy (Tran et al.,2020; Hatlevik et al.,2018). The level of digital competency in children is determined by the cultural capital and home book collections of affluent families (Hatlevik &

ISSN: 2688-9323

Christophersen,2013). In contrast, adolescents from lower socio-economic backgrounds are often at a disadvantage in acquiring higher levels of digital competence. Lower-income adolescents have less access to modern technology than those from economically well-off households, limiting their capacity to realize their full potential in acquiring online digital skills (Tran et al.,2020). Parents' level of education is also an important factor in Internet literacy. Studies have indicated a beneficial relationship between parents' educational attainment and their children's Internet literacy (Tran et al.,2020; Litt E,2013). Adolescents with highly educated parents live in more affluent circumstances, which means they are placed higher on the social capital ladder and have better and larger access to a wider selection of information resources via access or subscriptions (Foo et al.,2014). More research has shown that parents who have completed more education also help their kids more with technology when they use laptops for homework (Diogo, Silva & Viana,2018).

Additionally, some investigations have discovered that parental Internet use behaviors and attitudes, as well as other aspects of the home environment, have a direct impact on the Internet literacy of adolescents (Mroz & Solecki,2017). A study found a significant relationship between parents' Internet use behavior, Internet literacy, and parenting styles. It also found a significant relationship between parents' attitudes toward Internet use, such as encouraging and guiding their children to use the Internet and Internet parenting (Lou et al.,2010). The more comfortable parents were with the Internet, the more they cared about their kids' online behavior and the rules governing it. The ability of adolescents to reduce or avoid online risk may be influenced by parenting styles, particularly the degree to which parents limit their children's Internet use, according to research on the relationships between Internet addiction, information literacy, parenting styles, and levels of online activity (Leung & Lee,2012).

4.3. School Factors

Researchers have discovered that adolescents in urban schools have greater access to ICT resources and applications than students in rural schools and that this has led to a higher degree of ICT literacy among urban students (Umar & Jalil,2012). According to a study conducted in Taiwan, China, adolescents in urban areas had greater levels of information literacy overall than adolescents in rural areas, and adolescents in schools located in urban planning areas had information literacy levels that were comparable to those in schools located in non-urban planning areas (Liao & Chang,2010).

In terms of the educational environment, the implementation of Internet literacy teaching programs such as ICT programs has a good impact on improving adolescents' Internet literacy (Yuliana et al.,2021), as does the provision of relevant learning tools, resources, and flexible infrastructure in schools (Batool & Mahmood,2012). Different degrees of school IT education status had a substantial positive effect on adolescents' Internet literacy, which means that the better the IT education, the higher the level of adolescents' Internet literacy. Children's learning assistance also had a significant effect on Internet literacy (An & Liang,2023). The most effective strategy to improve minors' Internet literacy is to promote cyber education programs in schools, with a focus on information technology and cyber safety education (Tian, Zhang & Li,2021).

Regarding teacher literacy, teachers' views toward adolescents' use of the Internet, their teaching of the use of the Internet, and their Internet usage behaviors guide minors' use of the Internet to a considerable extent, which in turn affects minors' Internet literacy (Gill, Dalgarno & Carlson,2015). According to some researchers, what matters more is whether teachers can identify when students are lacking in a particular set of ICT competencies. Adolescents who have more cyber-technology-competent teachers and have enough opportunities to learn from them also have better cyber-technology competencies than students who have more cyber-competent teachers but do not get to take advantage of their skills (Aesaert et al.,2015). For

ISSN: 2688-9323

adolescents to achieve Internet literacy, teachers must be able to incorporate ICT and make use of their learning strategies and Internet literacy (Gill, Dalgarno & Carlson,2015).

5. What is the Impact of Adolescent Internet literacy

The majority of studies have focused on the factors that drive adolescent Internet literacy, with only a few looking at how adolescent Internet literacy affects other characteristics. While research is limited, experts have begun to investigate the relationship between adolescent Internet literacy and undesirable behaviors such as smoking, drinking, eating healthily, and online addiction, as well as whether there is a link to academic performance.

5.1. Behaviors Harmful to Health

Primack (2006) conducted a field study on smoking intentions among 14–18-year-olds and discovered that increased media literacy was independently linked to lower levels of current smoking and lower susceptibility to smoking in the future. The study also suggested that raising media literacy levels among adolescents could potentially reduce smoking behaviors. Research indicates that adolescents' use of alcohol and tobacco, eating disorders, and other unhealthy habits can be influenced by Internet media and that teaching media literacy can be useful in lowering negative attitudes and actions (Kupersmidt,2014; Wade et al.,2003). In contrast, some studies have found that adolescent Internet literacy increases rather than decreases the likelihood of internet addiction. They argue that the more internet skills adolescents have, and the more likely they are to be attracted to website content and produce internet content, the higher their likelihood of becoming addicted (Leung & Lee,2012).

5.2. Academic Performance

Leung and Lee (2012) discovered that the higher adolescents' Internet literacy scores, the better their academic performance, particularly those who were able to locate, navigate, and access various information resources as well as understand the context in which the information was generated, and they performed better in terms of overall grades and academic competence. Ukwoma et al. (2016) explored how digital literacy enhances teenagers' abilities to search for documents, communicate, and distinguish various sources of information, all of which contribute to learning efficiency and academic achievement. Diergarten et al. (2017) discovered that, even after adjusting for other pertinent variables like IQ, media literacy remains a highly significant and favorable predictor of a person's media-learning behavior.

6. Discussions and Future Directions

6.1. Discussions

To address the first research question, "What is the definition of Internet literacy?" this study begins with a thorough explanation of the conceptual sources and definitions of Internet literacy. As a result of the ongoing advancements in information and communication technology, people are increasingly using the Internet to meet demands in their daily lives and for production. However, proficiency with basic Internet usage is required, so traditional literacy is evolving into Internet literacy. At the same time, this paper holds that Internet literacy is a conceptual collection of computer literacy, media literacy, information literacy, and digital literacy. Adolescent Internet literacy emphasizes that adolescents should possess the necessary abilities for the above series of literacy, including the skills of using digital tools and digital technologies to obtain information, communicate, evaluate, use, and innovate, as well as having critical thinking, keeping alert to negative information in the Internet, and having basic network ethics and network security awareness.

ISSN: 2688-9323

This study also discusses the evaluation methods for measuring the level of adolescents' Internet literacy and finds that the evaluation indicators of Internet literacy have evolved from a single technical level to a multidimensional and comprehensive level of competence, which is mainly evaluated through two main methods: surveys and interviews, where surveys include the development of questionnaires and evaluation scales. However, the division of dimensions in the scales and questionnaires developed to measure Internet literacy has not yet been harmonized due to different research perspectives and focuses. For instance, some scholars will pay more attention to adolescents' self-management skills, Internet awareness, and community interaction (Wang et al.,2020; Stodt, Wegmann & Brand,2016; Huang et al.,2021). While some academics choose to focus on how Internet users may assess and interpret information (Livingstone & Helsper,2010; Kim & Yang,2016), others will cover topics related to online safety and health, like Internet addiction and online privacy (Mıhcı Türker & Kılıç Çakmak,2019).

Additionally, this study provides a summary of the various elements that affect adolescents' Internet literacy, roughly classifying them as individual, familial, and educational variables. Age, gender, and education level are some of the individual aspects that have received increased attention. However, there is inconsistent evidence on the effects of age and gender on adolescents' Internet literacy, and other researchers contend that these factors do not significantly affect Internet literacy (Monteiro & Leite,2021; Sunny & Ramasamy,2024; Morgan, Sibson & Jackson,2022; Umar & Jalil,2012). Conversely, some researchers hold the opposing position that the impacts of age and gender on the Internet literacy of adolescents are distinct (Livingstone & Helsper,2010; Nguyen & Habók,2022; Aesaert & Braak,2015). A possible reason may be that the frequency of Internet use and the online skills possessed have a greater impact on the level of Internet literacy than age and gender. Most studies have found that educational attainment has a significant impact on Internet literacy (Liao & Chang,2010), while a few researchers have looked at the effects of adolescents' length of Internet exposure (Len-Ríos et al.,2016) and self-efficacy (Aesaert et al.,2015; Hargittai & Shafer,2006) on Internet literacy. The socioeconomic condition of the family, the parent's educational attainment, and their Internet usage habits are the family aspects that are most frequently highlighted. Numerous studies have consistently demonstrated a significant and positive correlation between a family's socioeconomic status the parents' educational attainment and their children's level of Internet literacy (Tran et al.,2020; Hatlevik & Christophersen,2013; Litt,2013; Foo & Majid,2014). This is because economically privileged children and parents are more likely to have better physical access to the Internet, access a greater variety of information sources, and develop higher levels of Internet skills. Parents' Internet use conduct has a modest influence on their children's Internet use behavior, and limiting their children's Internet use can also lower youth's online hazards (Mroz & Solecki,2017; Lou et al.,2010; Leung & Lee,2012). The location of the school, the atmosphere for teaching and learning there, and the teachers' level of Internet literacy are the components of school variables that are most frequently mentioned. The study discovered that adolescents' Internet literacy was influenced by a school's location, with urban students often having better levels of Internet literacy than their rural counterparts (Umar & Jalil,201). This could be a result of the digital divide between regions, which produces urban-rural disparities, and network infrastructure development in rural areas should be increased. Research has consistently shown that the implementation of web-related teaching programs in schools, as well as teachers' Internet literacy, have a significant positive impact on adolescents' Internet literacy (Yuliana et al.,2021), and both can serve as a guide in the development of adolescents' web skills and the improvement of their Internet literacy levels.

Some research has demonstrated that strengthening adolescent Internet literacy is effective in reducing adolescent health-harming behaviors such as smoking, alcohol intake, and eating disorders (Primack,2006; Kupersmidt,2014; Wade et al.,2003). But there are also studies

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showing that the more Internet literacy a teenager is the more likely they are to develop an Internet addiction (Leung & Lee,2012). A smaller group of researchers also looked into the connection between academic performance and adolescents' Internet literacy and discovered that there was a favorable correlation (Ukwoma et al.,2016; Leung & Lee,2012; Diergarten et al.,2017).

6.2. Future Research Directions

Enriching the concept of Internet literacy. The development of science and technology is ever-changing, and in this day and age, big data and artificial intelligence are always evolving, and in the future, there will be more new network technologies. Thus, to continuously improve Internet literacy and establish a methodical analytical framework, researchers must reevaluate the conditions and requirements to meet the current social context and mastery of emerging information technologies. The idea of Internet literacy must therefore be updated with the times.

Improving the evaluation of adolescent Internet literacy. This study discovered that the existing techniques for evaluating the level of Internet literacy are primarily questionnaires and the production of scales, with a small number of studies using interviews and experimental approaches. To create an index system for evaluating youth Internet literacy, future research can: (a) use the current scale and refine it further. (b) introduce new research methodologies, integrate qualitative and quantitative techniques, and explore Internet literacy from multi-dimensions based on the new statistical methods. (c) analyze in depth the relationship between the variables and Internet literacy, as well as the precise pathways of action. If required, big data analytics and algorithms may be employed to support the research.

Exploring more factors influencing adolescent Internet literacy and the impact of adolescent Internet literacy. This study examines the elements influencing teenagers' Internet literacy and discovers that the majority of studies concentrate on demographic factors for specific aspects impacting adolescents' Internet literacy, whereas the majority of studies pay little attention to adolescents' self-efficacy and how much time they spend on the Internet. To develop targeted countermeasures to raise the level of Internet literacy among adolescents, future research should focus more on the cognitive and psychological aspects of adolescents' motivation to use the Internet, their understanding of basic Internet knowledge, and their self-efficacy. It should also thoroughly examine the internal mechanisms of the various influencing factors. In addition, this paper only explored the effects of adolescent Internet literacy on both harmful health behaviors and academic performance, and other aspects of research could be strengthened in the future.

Focusing on Internet literacy research for teachers and parents. This study discovers that while the majority of research on teenage online literacy has only examined it from the adolescent perspective, parents, instructors, and schools are equally crucial in helping adolescent online literacy. To more fully explore the deeper connection between teachers' and parents' internet literacy and youths' internet literacy and to fully realize their guiding roles, future research could develop internet literacy scales for teachers and parents as well as discuss the factors that influence their internet literacy.

7. Conclusion

In the digital age, the Internet is more incorporated into people's daily lives, yet this process can also result in digital inequality due to a variety of circumstances, leading to the phenomenon of the digital divide. As the Internet access divide narrowed, researchers began to focus on differences in Internet use, particularly in levels of Internet literacy. As the aborigines of the Internet, adolescents are heavily influenced by it and have been the focus of experts,

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therefore this study provides a literature review on adolescents' Internet literacy to decrease the digital divide. It primarily investigates Internet literacy from three perspectives, including the definition of Internet literacy, methods for measuring the level of Internet literacy among adolescents, and factors influencing adolescents' Internet literacy, in the hope that it will serve as a resource for policymakers, parents, and schools, as well as guide adolescents to make proper use of the Internet and improve their Internet literacy, thereby helping to close the digital divide.

The notion of Internet literacy has evolved from a single skill dimension to a multidimensional dimension of information comprehension, creation, and dissemination that includes a wide range of literacy qualities such as computer literacy, information literacy, media literacy, and so on. This study also discusses evaluation methods for measuring the level of Internet literacy among adolescents and finds that existing studies have mainly used the creation of evaluation scales and the design of questionnaires, but the specific delineation of dimensions has not yet been standardized. In addition, this paper proposes many factors that influence adolescents' Internet literacy, which are broadly categorized into individual, family, and school factors. There is no consistent research showing that the individual factors of age, gender, and length of Internet exposure significantly affect adolescents' Internet literacy. However, studies consistently show that educational attainment and adolescents' self-efficacy positively affect their level of Internet literacy. Studies have consistently indicated that family factors such as family socioeconomic status, parents' education level, and parents' Internet use behaviors are all positively related to adolescents' Internet literacy. Concerning school factors, it was found that differences in school location would have a certain impact on adolescents' Internet literacy and that the internal teaching environment of the school as well as the teachers' Internet literacy would have a significant positive impact on adolescents' Internet literacy. Enhancing adolescent Internet literacy can help prevent dangerous health behaviors and improve adolescent academic achievement.

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