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KEYBOARD USAGE TECHNIQUES AND NEEDS FOR INDIVIDUALS WITH VISUAL IMPAIRMENT AND PHYSICAL DISABILITIES

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ABSTRACT

The aim of this study is to examine the difficulties encountered by individuals with visual and physical disabilities regarding keyboard use, to determine the needs of these individuals and to provide technical, ergonomic and technological solutions suitable for these needs. At the same time, it is also aimed to develop practical suggestions for these individuals to have easier access to information technologies in education, employment and daily life. Traditional review method was used as a method in the research. Visual and physical disabilities cause problems such as pressing the wrong keys, key repetition and cursor control difficulties during keyboard use due to limitations in individuals' motor skills and visual abilities. In this study, technological solutions such as software features such as Sticky Keys, Repeat Keys, alternative input devices and multimodal adaptation algorithms were evaluated for the needs of these individuals. At the same time, the importance of keyboard training, individual adaptation strategies and integration of supportive technologies were discussed. As a result of the literature review, it was emphasised that innovative methods should be developed to increase the access of individuals with visual and physical disabilities to information technologies in education, employment and daily life. In this context, strategic approaches to support individuals' independence and social integration are proposed.

Keywords: Visual Impairment, Physical Disability, Keyboarding Techniques.

1. INTRODUCTION

Computer technologies play an important role in the daily lives of individuals with various special needs. However, these individuals face various difficulties when using standard computer input devices such as keyboards (Trewin & Pain, 1999). Individuals with special needs face an unequal situation in accessing information technologies. Most of these individuals experience serious obstacles in using computers and keyboards due to limitations in motor skills. This situation causes lagging behind in both education and employment (Donne, 2012). Individuals with special needs are defined as individuals who show learning behaviours different from normal individuals and exhibit differences in affective, cognitive, emotional, physical and communication (Tortop, 2015). Special needs are explained by both physical and mental dysfunctions and the deficiency or difficulty they cause in movement ability, attitude and behaviour (Arıkan, 2002). However, it is emphasised that it is not only the disabilities that make people with special needs, but also the environmental barriers that are not removed and the services that are not provided (Goltsman et al., 1993).

Considering that we obtain 80-85% of our information about life through vision, the importance of visual function in our lives is more clearly understood (Enç, 2005). Those who can read written

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materials only with the help of magnifying devices are defined as individuals with low vision (Cavkaytar & Diken, 2005). Individuals with low vision need materials such as magnifiers, glasses, large print, lighting devices and environmental arrangements in order to use their visual function at the highest level (Ataman, 2003). Individuals with visual impairment are those who are severely affected by visual field deficiency and need tactile and auditory materials. These individuals need Braille or audio books for reading (Cavkaytar & Diken, 2005; Ataman, 2003). The effective use of information and communication technologies (ICT) in the educational processes of individuals with special needs plays a critical role in increasing their access to educational opportunities (Course, 2006). Keyboarding is an important tool as an alternative to traditional writing tools, especially for students with limited fine motor skills (Rebello, 2021). Such needs of individuals with visual impairment can directly affect their access to technology and thus their success in education and employment. This article examines techniques and solutions developed to improve the keyboarding experience of individuals with different special needs. It will also draw attention to the fact that disabilities are caused not only by individual disabilities but also by environmental and social constraints.

2.METHOD

The aim of this study is to examine the difficulties encountered by individuals with visual and physical disabilities regarding keyboard use, to determine the needs of these individuals and to provide technical, ergonomic and technological solutions suitable for these needs. At the same time, it is also aimed to develop practical suggestions for these individuals to have easier access to information technologies in education, employment and daily life. Traditional review method was used as a method in the research. The traditional review method is defined as a research method that summarises and analyses the existing literature on a specific topic in a non-systematic way (Grant & Booth, 2009).

In the research process, Google Scholar databases were scanned and academic studies on the subject were identified and analysed. The scientific studies obtained from the relevant databases were meticulously analysed and a comprehensive body of information on the subject was created. In addition, all sources used in the research process were properly cited and scientific ethics rules were fully complied with.

3. LITERATURE REVIEW

3.1 Visual Impairment and Characteristics of Individuals with Visual Impairment

Individuals with visual impairment are people who have completely or partially lost their sight. The characteristics and needs of these individuals may vary depending on the degree and duration of vision loss and the individual's living conditions. Vision loss can significantly affect individuals' daily lives, learning processes and social interactions. Visual impairment can be categorised into two main categories; congenital and acquired visual loss. Congenital visual impairment is a condition in which visual loss occurs before, during or immediately after birth. These individuals have no visual memory and their learning processes are shaped entirely by auditory and tactile means (Asrorov, 2021). In contrast, individuals with acquired visual impairment lose their vision later in life. These individuals may have visual memory, which may facilitate their learning and adaptation processes (Asrorov, 2021).

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Vision loss can negatively affect individuals' self-confidence and social interaction skills. There may be difficulty in environmental awareness due to lack of visual information (Asrorov, 2021). However, these difficulties can be overcome with appropriate support programmes and education. Individuals can acquire the necessary skills to lead an independent life and participate in society (Leeuwen et al., 2015). The learning processes of individuals with visual impairment are generally supported by auditory and tactile methods. Braille, auditory materials and tactile tools are the basic tools for the education of these individuals (Asrorov, 2021). In addition, they need special education programmes to improve their independent living skills, social interaction skills and mobility (Leeuwen et al., 2015).

3.2 Physical Disability and Characteristics of Individuals with Physical Disability

Physical disability refers to limitations in an individual's motor functions and may be caused by various health problems, congenital disorders or subsequent traumas. Physical, social and environmental supports are necessary to improve the quality of life and social participation of these individuals. The level of disability can be measured by the individual's level of independence in activities of daily living. For example, different support mechanisms may be needed for individuals who have difficulty in physical activities such as walking, carrying and climbing stairs (Fried et al., 1994).

Physical disabilities can profoundly affect the psychological and social lives of individuals. Research shows that these individuals may face problems such as low self-esteem, social isolation and stress. However, these effects can be alleviated with appropriate rehabilitation and support programmes (Lupton & Seymour, 2000). For individuals with physical disabilities, physical activity plays an important role in both physical and emotional health. Regular physical activity increases muscle strength, improves motor skills and increases the level of independence of individuals. Studies on children and adolescents have shown that physical activity increases social integration and improves quality of life (Bloemen et al., 2014).

3.3 Basic Problems Arising in Keyboard Use

Limitations in motor skills significantly affect the keyboarding performance of individuals. These individuals often encounter problems such as involuntary touching the keys, key repetition and pressing the wrong keys (Trewin & Pain, 1999). Software features such as Sticky Keys and Repeat Keys have been developed to reduce keyboard usage errors (Edwards, 1995; Vanderheiden, 1992). In addition, empirical studies have been conducted to identify performance errors that occur during keyboard and mouse use and to offer solutions (Trewin & Pain, 1999). These errors include repetition errors, incorrect keystrokes and inability to control the mouse cursor. Research shows that keyboard use improves the writing skills of individuals with special needs and increases their educational achievement (Mote & Zahner, 2004). Especially in individuals with physical disabilities, keyboarding increases independence and supports students' self-confidence (Course, 2006).

3.4 Training and Adaptation Strategies

Keyboard training is critical for developing individuals' computer skills. National occupational education associations have stated that keyboard training should be provided to students at an early

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age (Donne, 2012). For individuals with special needs, this training process should be optimised by adapting it to individual needs. Donne (2012) emphasised that educators are not sufficiently prepared for keyboard training and that more professional development programmes are needed in this regard. It is known that keyboard use improves cognitive skills as well as academic achievement in students with special needs. The use of such technologies increases students' critical thinking and problem solving skills (Course, 2006). In addition, keyboard training supports students' social interactions and communication skills (Rebello, 2021).

3.5 Supporting Technologies and Solutions

Technological developments offer various solutions to improve the computer experiences of individuals with special needs. Multimodal adaptation algorithms have improved keyboard and mouse use by enabling individuals with physical disabilities to reach targets in visual interfaces more easily (Biswas & Langdon, 2012). These algorithms provide automatic support mechanisms to zoom the cursor to the targets and reduce errors. These algorithms provide automatic support mechanisms to move the cursor closer to the targets and reduce errors (Trewin, 1996). In addition, the integration of alternative input devices and software designed to improve users' performance is also supported. Keyboard training can increase typing speed by enabling students to develop correct finger placement and regular stroke techniques (Mote & Zahner, 2004). Specialised software such as ‘Mavis Beacon Teaches Typing’ optimises the learning process by providing feedback tailored to the individual needs of learners (Mote & Zahner, 2004).

4. RESULTS AND DISCUSSION

Facilitating the access of individuals with visual and physical disabilities to computer technologies is critical to ensure that individuals benefit equally from educational and employment opportunities. This study provides a road map for individuals to benefit from information technologies at the maximum level by presenting technological and educational solutions to the main problems encountered in keyboard use. Keyboarding is an important support tool in the education of individuals with special needs. The effective application of such technologies enables these individuals to access more equitable opportunities in the educational process (Course, 2006; Rebello, 2021). It is critical that educators support this process by developing techniques appropriate to the needs of individuals (Mote & Zahner, 2004). Software tools such as Sticky Keys, Repeat Keys, and alternative input devices increase the usage performance of individuals and reduce the barriers encountered in keyboard use. In addition, training programmes tailored to individual needs increase the self-confidence and independence of individuals. Technological innovations and educational strategies should be integrated to improve the keyboarding experiences of individuals with special needs.

A study by Trewin and Pain (1999) presented a detailed analysis of errors in keyboard and mouse use of 20 individuals with physical disabilities. This study revealed the positive effects of the developed software and hardware solutions on the performance of individuals. In addition, a review by Goria et al. (2016) highlighted the lack of adaptability of technological devices developed for individuals with visual impairment for children. Software features such as Sticky Keys and Repeat Keys offer effective solutions to improve the performance of these individuals. In addition, educators need to receive more support on educational techniques appropriate to the needs of individuals with special needs (Donne, 2012). Future research should focus on making

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existing technologies more useful for children and adults (Goria et al., 2016). These efforts will support new approaches to improve the quality of life of individuals with special needs. It can be said that technology developers and educators should produce more accessible and inclusive solutions by considering the needs of individuals with visual and physical disabilities. Future studies will contribute to the development of more innovative and sustainable technological solutions by analysing the experiences of these individuals in more detail. These approaches will strengthen the social integration of individuals and improve their quality of life.

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