Predictor Variables on Continuance/Discontinuance of Assistive Technology in Teaching and Learning -A Review

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Abstract

With the increase of people with disabilities that translates to an increased need to use assistive technologies it is paramount to be careful to manufacture and acquire assistive devices that are effective and efficient. Discontinuance of a device leads to waste of time and money both to the manufacture and the students. This review focuses on the predictor variables that determine the continuance/ discontinuance of an assistive device. This is a conceptual that takes into considerations the studies that have been done. Roger's theory of diffusion has been used.

Three of the four most important criteria consumers used to assess assistive technology devices (effectiveness, operability and durability) were related to relative advantage. Adoption of a device is accelerated if it is perceived the innovation is compatible with the needs and experiences of the user. Triability prevents discontinuance although the individual customers are always denied a chance to try the innovation before acquiring it. If an innovation can be modified by the user it leads to less discontinuation although no empirical studies have been done to confirm this. Professional support is deemed to lead to continued use. Device training and maintenance leads to continued use as well as students involvement. On the other hand, changes in students needs lead to discontinuation.

Key words

Assistive technology, predictor variables, Triability, operability, effectiveness

Introduction

The Concept of Assistive Technology

Assistive technology refers to the devices and services that are used to increase, maintain, or improve the capabilities of a student with a disability (Dell, Newton, &Petroff, 2012). The foundation For Assistive Technology (FAST) defines AT as any product or service designed to enable independence for disabled and older people (FAST,2001). The British Educational Communication and Technology (BECTA) defined AT as their software and technology which helps people with disabilities and special needs to overcome the additional barriers they face in communication and learning (Becta, 2003).

Bryant and Bryant (2003) grouped assistive technologies into seven categories, these include positioning and seating, mobility, augmentative and alternative communication, computer access, adaptive toys and games, adaptive environments, and instructional aids. However, Reed and Lahm (2005) categorized assistive technologies into thirteen categories based on the task for which each is useful: computer access, motor aspects of writing, composing written material, communication, reading, learning/ studying, math, recreation and leisure, electric aids for daily living, mobility, vision, hearing and vocational. Wong and Cohen (2011) did general classification of assistive technology devices as a spectrum of equipment, from high to low tech that which can be applied in writing, reading, access to computers, communication, mobility and leisure.

According to Georgia's Assistive Technology (2011) the low tech devices do not require onerous training and are in expensive. Low -tech devices examples are handheld magnifiers, large print texts, and canes. Hightech devices are more sophisticated tools requiring special training to use the devices effectively. The devices are more expensive such as voice recognition, digital hearing aids, electronic organizers and communication devices with voices.

Assistive technology devices enable individuals with disabilities to participate in society as contributing members. These devices are also credited with helping individuals with disabilities achieve optimal functional ability and independence (Phillips & Zhao, 1993). Furthermore, technology is recognized as a means for individuals with disabilities to access the mainstream society (Uslan, 1992) and as a mode to potentially equalize the capabilities of persons with and without disabilities (Scherer, 1993a). According to the National Center for Health Statistics, more than 17 million Americans used an assistive technology device in 1994 to accommodate for impairment (National Center for Health Statistics, 1997, November 13).

The increase in assistive technology use may be attributed to the federal laws passed which support funding for assistive technology devices and services. Although these laws increase the accessibility of assistive technology, many recipients are dissatisfied with devices and services. Dissatisfaction typically results in discontinuance of assistive technology devices. A national survey on technology abandonment found that 29.3% of all devices obtained were abandoned (Phillips & Zhao, 1993). Discontinuance of assistive technology represents a waste of time and money. There is however, limited research documenting factors related to assistive technology discontinuance from consumers' perspectives. It is important to gain an understanding of these factors to aid professionals in designing assistive technology service delivery techniques. Assistive technology can improve teaching and learning in inclusive classrooms in various ways (Kleiman, 2010).

Predictor variables affecting

continuance/discontinuance of assistive technology

Rogers' theory of diffusion (1995) offers a comprehensive philosophy regarding the processes involved in accepting or discontinuing use of technology. According to this theory, discontinuance is a decision to discard an innovation after previously accepting it.

The two types of discontinuance are replacement (rejection of an innovation for an improved one) and disenchantment (rejection of an innovation due to dissatisfaction). Relative advantage, compatibility, trialability and re-invention are concepts derived from the diffusion of innovations theory. Other additional factors include professional support, Device training, consumer involvement and changes in consumer needs.

1. Relative advantage

Relative advantage is identified as a significant factor associated with continuance or discontinuance of technology. This factor relates to the characteristics of the device itself (Rogers, 1995) and examines the relative advantage that continued use of a device offers a user over discontinuing its use. A study of long term consumers of assistive technology devices indicated that three of the four most important criteria consumers used to assess assistive technology devices (effectiveness, operability and durability) were related to relative advantage (Batavia & Hammer, 1989).

2. Compatibility

The second concept, compatibility, refers to the degree an innovation is perceived as consistent with the needs of the adopter (Rogers, 1995). According to Rogers, compatibility is a factor related to continued use of an innovation. According to Jwaifell and Gasaymeh (2013) the process of adopting an innovation can be accelerated if the individual feels that this new innovation is compatible with their needs and experiences. Rogers (2003) stated that "compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 15). For innovation in learning materials, the new idea may or may not be compatible with students' socio-cultural values, beliefs, or needs for the new technology.

A lack of compatibility in AT with individual needs may negatively affect the individual's AT use (McKenzie, 2001). Hoerup (2001) describes that each innovation influences student' opinions, beliefs, values, and views about teaching. If an innovation is compatible with an individual's needs, then uncertainty will decrease and the rate of adoption of the innovation will increase.

3. Trialability

Trialability, the degree to which the user can experiment with the technology prior to acquisition, was also related to continued use of technology (Rogers, 1995). Research demonstrated, however, that individuals with disabilities are not often given the opportunity to try out assistive technology devices prior to purchasing them. For instance, Parette, VanBiervliet and Holbrook (1990) found that almost half of the individuals with visual impairments sampled were unable to try out their devices prior to purchasing them. Individuals denied the opportunity to try out technology before purchasing it must rely on the judgment of the professional who selects the device for them (Parette&VanBiervliet, 1992). Theoretically, and pragmatically, trialability has been noted as an effective means to prevent technological discontinuance and promote ongoing use (Parette&VanBiervliet, 1992). It has not, however been fully incorporated into the process of distributing technology to individuals with disabilities.

4. Re-invention

The degree to which technology is changed or modified by a user in the process of its adoption and implementation is termed reinvention (Rogers, 1995). Many individuals with disabilities have devised additions or modifications to their devices to meet their unique needs (Zola, 1982). As a result of re-invention, technology can become more appropriate in meeting an individual's present needs and more responsive to future needs that arise (Rogers, 1995). Although re-invention was studied extensively from a broad theoretical perspective in the diffusion of innovations theory, empirical research relating re-invention to continued use of assistive technology by individuals with disabilities is nonexistent.

5. Professional support

Professional support (change agent contact') is also a factor related to ongoing use of technology in the diffusion of innovations theory (Rogers, 1995). Rogers indicated that professional support is one of the variables most highly related to continued use of technology. Additionally, research on assistive technology contends that individuals with disabilities without support are typically less successful than those who have it. For instance, individuals without social support often discontinue technology (Scherer, 1993b) with a loss of functioning, learning capacity, employment and/or quality of life (Galvin & Wobschall, 1996). Support services in the form of device training (Raskind, 1993; Scherer, 1993a; Scherer & Galvin, 1996), and device maintenance (Batavia, Dillard, & Phillips, 1990; Scherer & Galvin, 1996; Tewey et al., 1994) were also documented as essential to continued use of assistive technology.

6. Device training and maintenance

Device training and maintenance are not always provided to individuals with disabilities receiving assistive technology devices. Parette and VanBiervliet (1992) found that out of the 680 individuals with mental retardation who were involved in the study, 32% reported not having enough training and more than one-third were dissatisfied with the amount of time required for service of their technology.

In summary, diffusion theorists claimed that innovations that are perceived by individuals as having greater relative advantage, compatibility, trialability and re-invention will be rapidly adopted and slowly discontinued (Rogers, 1995).

7. Consumer involvement

A review of literature reveals that there is consensus that consumer involvement in the selection, acquisition, use and maintenance of assistive technology devices is important (Carroll & Phillips, 1993; Freeman & Field, 1994; Phillips &Broadnax, 1992; Scherer, 1993a; Tewey et al., 1994; Turner et al., 1995). Other research results demonstrated that devices are discontinued less frequently when users believe their opinions are taken into consideration in the selection process (Gradel, 1991; Phillips & Zhao, 1993).

8. Change in consumers' needs

A change in consumers' needs has also been cited as a significant cause of discontinuance of assistive technology devices (Tewey et al., 1994). Researchers indicated that changes in individuals with disabilities' priorities and/or needs, rather than problems with assistive technology devices, often results in device discontinuance (Parker &Thorslund, 1991; Phillips &Broadnax, 1992: Scherer & Galvin, 1996). Overall, some technological discontinuance is to be expected as individuals with disabilities experience changes in their lives.

In summary, researchers have studied a variety of consumer and assistive technology device variables in an effort to predict use versus discontinuance of assistive technology devices. However, to date, no studies examine the relationship between continuance/ discontinuance of assistive technology devices and a combination of predictor variables (relative advantage, compatibility, trialability, re-invention, support, consumer involvement, and changes in consumers). Three of the four most important criteria consumers used to assess assistive technology devices (effectiveness, operability and durability) were related to relative advantage.Adoption of a device is accelerated if it is perceived the innovation is compatible with the needs and experiences of the user.Triability prevents discontinuance although the individual customers are always denied a chance to try the innovation before acquiring it.If an innovation can be modified by the user it leads to less discontinuation although no empirical studies have been done to confirm this.Professional support is deemed to lead to continued use. Device training and maintenance leads to continued use as well as consumer involvement. On the other hand changes in consumer need lead to discontinuation.

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References

- [1] Becta (2003). What the research says about ICT supporting special educational needs (SEN) and inclusion.
- [2] Bryant, D. P., & Bryant, B. R. (2003). Assistive technology for people with disabilities. Boston, MA: Allyn& Bacon
- [3] Dell, A. G., Newton, D. A., &Petroff, J. G. (2012). Assistive Technology in the Classroom: Enhancing the School Experience of Students with Disabilities. Columbus, Ohio: Pearson Prentice Hall
- [4] Georgia's Assistive Technology (2011). What is assistive technology? Retrieved fromhttp://www.gatfl.org/Assistive Technology.aspx
- [5] Hoerup, S.L. (2001). Diffusion of an innovation: computer technology integration and the role of collaboration(Doctoral dissertation, Virginia Polytechnic Institute and State University, ProQuest Digital Dissertations. (UMI No.AAT 3031436).
- [6] Jwaifell, F&Gasaymeh, A (2013) Using the Diffusion of Innovation Theory to Explain the Degree of English Teachers' Adoption of Interactive Whiteboards in the Modern Systems School in Jordan. Contemporary Educational Technology,4(2), 138-149.
- [7] Kleiman (2010). Assistive technology can improve teaching and learning in inclusive classrooms in various ways
- [8] McKenzie, J. (2001). How teacher learn technology best. From Now On: The Educational Technology Journal, 10(6). Retrieved March 01, 2005, from http://www.fno.org/mar01/ howlearn.html
- [9] Rogers, Everett M. (2003) Diffusion of Innovations. New York: Free Press.
- [10] Wong, M. E., & Cohen, L. (2011). School, family, and other influences on assistive technology use: Access and challenges for students with visual impairments in Singapore. The British Journal of Visual Impairment, 29(2), 130-144.

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