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Construction and Standardization of Internet Self-efficacy Scale for Secondary School Students

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ABSTRACT Information and Communication Technology has changed the way of learning and sharing the knowledge in the education sector. Students prefer to participate and learn in web based environment. But they can be benefitted in this environment only if they have internet self-efficacy. The objective of this paper is to construct an "Internet Self-efficacy Scale" which can be used to determine the internet related ability and skills of secondary school students. The internet self-efficacy scale was administered to 350 students studying in ninth and tenth grades. Initially a preliminary draft of scale comprising 51 statements was constructed. After review and evaluation of statements by the experts, statements were reduced to 33. The 17 statements were retained in the final draft of the scale. The results of test-retest reliability indicate that the scale is reliable with reliability coefficient 0.89. Content validity was calculated and the scale developed was found to be valid.

INTRODUCTION

Advancements in the field of Technology have changed the way of learning and sharing the knowledge in the education sector. Information Communication Technology (ICT) in education has facilitated the learning process and helped in improving the performance by creating, using and managing appropriate technological processes and resources (Kguirnela 2014). Education institutions are rapidly adopting the concepts and practices of technology that has brought revolutionary changes in the domains of teaching and learning. Jones (2017) states that over the years, the number of technological devices used in the classroom have been steadily increasing. He further added that the most popular technology used in classrooms has been small laptops and tablets.

Technology has become integral part of students' life. Students prefer to participate and learn in web based synchronous or asynchronous environment. This environment broadens individualized instruction and promotes the development of personalized learning. Through internet, students communicate comfortably and confidently with teachers and classmates (Hung et al. 2010). In the view of Eachus and Cassidy (2006), web-based resources are becoming so important within higher education that both students and staff feel confident and competent in the access, provision and utilization of these resources. Mobile phones, TV and the internet have opened up new ways of e-learning to complement conventional classroom instruction (Kapenieks et al. 2014). Studies have shown that high internet usage brings better academic result as students get the opportunity to enter into the world of information (Siraj and Salam 2015; Carter et al. 2016).

Digital media has integrated into daily life and used predominantly for education work and leisure (McLelland 2016) and provides various benefits to the students as well as teachers. Jung et al. (2012) state that adolescents have grown up with the internet and they regularly use it as a tool to communicate, search for educational resources, buy goods and services, and to achieve other extra-curricular goals. But students and teachers can avail its benefits only if they have self-efficacy towards internet. Digital citizenship must be associated with internet self-efficacy and internet anxiety (Choi et al. 2017), otherwise they will face different problems related to complexity of web based course, information retrieval and heavy workload etc. The solution to all requires making use of requisite

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technical skills and search skills. They may also encounter situations like lack of physical contact between the teacher and taught; difficulty in adopting and making satisfactory use of available e-resources. The success of students in the internet driven environment or internet-assisted education is affected by e-skills that is internet self-efficacy. Due to the various characteristics associated with online learning environments, the learning performance of students can be influenced by student-perceived internet self-efficacy (Compeau and Higgins 1995).

Internet self-efficacy refers to the individual's belief regarding their ability to use internet. In the view of Kuo et al. (2014), internet self-efficacy is the ability of an individual to evaluate his or her own internet usage as well as the ability to successfully perform internet tasks independently. One can successfully perform in an internet friendly environment if, one has a distinct set of behaviors; required to establish, maintain and utilize effectively the internet over basic personal computer skills (Eastin and LaRose 2000). It guides students' views, strategies and outcomes when they learn through internet based instruction (Oskay 2011). According to Tsai and Tsai (2003), internet self-efficacy is a personal evaluation of users' abilities to use the internet to produce an intended outcome. Study of Kao and Chien (2017) has found that by improving preschool educators' ability to use the internet as well as relevant web-based tools may increase their approaches to learning by web-searching that will further strengthen their learning performances in internet-based environments.

Positive computer self-efficacy has been found to be related to willingness to choose and participate in computer- based activities, expectations of success, perseverance when faced with difficulties and computer based performance (Eachus and Cassidy 2006). Students have greater chance of success in computer and internet-related tasks if they are equipped with high sources of Internet self-efficacy (Chuang et al. 2015). The effective use of an internet is influenced not only by the system design features but also by the user's ability to use the system effectively in making decisions, planning work, serving customers, or controlling events. Students show stronger preferences for the online learning environment if they have the ability to navigate and meaningfully integrate real life problems.

Savage and Tokunaga (2017) revealed that the level of internet self-efficacy influences verbal aggressiveness, social skills and cyber bullying perpetration amongst people. Persons having low levels of internet self-efficacy with trait aggressiveness and social skills are likely to send hurtful or embarrassing messages over the internet or mobile technologies as compared to their counterparts.

The domains of internet self-efficacy specify the knowledge an individual has in particular area of internet usage. These domains are internet knowledge, information retrieval and provision, communication, manipulation, browsing, instant messenger, image, audio and video sharing. These measure the capability of an individual to use internet facilities and will help in determining the internet self-efficacy of an individual.

No doubt, internet has the potential to put impact on many facets of education, but in many cases the students have limited ability/inability to control that potential. This inability refers to the lack of necessary skills or abilities- or it may simply be a belief which results in incapacity and poor motivation (Eachus and Cassidy 2002). Students having low internet self-efficacy lack confidence in their ability to use online resources to achieve desired results as compared to their counterparts. There are various factors that affect the internet self-efficacy like previous internet experience (Eastin and LaRose 2000), internet anxiety (Torkzadeh et al. 2006), students' satisfaction (Reinhart and Schneider 2001), information searching skills (Tsai and Tsai 2003), ability to use internet and attitudes towards web based courses (Liang and Tsai 2008) and student's computer self-efficacy (Zoltan and Chapanis 1982).

Studies have also shown that students having higher internet self-efficacy show better performance in learning outcomes. Thompson et al. (2002) pointed out that internet self-efficacy positively predicted students' performance. Tsai and Tsai (2003) found that students with high internet self-efficacy have better information searching skills and learn better than those with low internet self-efficacy. Internet experiences in a class have a positive correlation with student satisfaction (Lim 2001). Liang and Tsai (2008) revealed that internet self-efficacy might foster the preferences of constructivist internet-based learning environments.

From the plethora of literature reviewed above, it is clear that internet based instruction is resurging the classroom instruction. Hence, learners' appropriate attitudes and adequate self-efficacy toward the internet is the critical prerequisite for the internet-based instruction. Although internet self-efficacy scale was constructed and validated by other researchers also (Tsai 2004; Raja 2016; Dogru 2017) but the findings of the present study would provide new and additional internet self-efficacy scale for adolescents. So after a thorough scrutiny of the available literature and tools, the researchers felt the need to construct a scale that will probe deeper into the internet self-efficacy of adolescent students.

Objective

Following is the objective of this paper:

- To construct and standardize Internet Self-efficacy Scale for secondary school students.

Significance of the Research

Internet has emerged as the most useful technology of digital era and has influenced our personal and professional developments. In learning environments, courses are more frequently being offered online. Internet has made the instruction self-paced and personalized that tailors the individual needs. Through the internet, students can get a huge store of general and research based information, books and journals. Although internet provides ocean of information, there is still a need to know whether students are able to utilize the internet services effectively or not. Due to the increase use of internet in teaching-learning process, internet-related abilities or e-skills have become more important. Search skills are not only essential for using internet resources confidently but studies have also shown that students with high internet self-efficacy performed better than with low internet self-efficacy. This can be measured with the help of internet self-efficacy scale. This will measure psychological characteristics of learners in online environment. Some of the researchers have developed their own scales to measure internet self-efficacy. When the studies about self-efficacy towards internet for secondary school students are examined, no study has yet been considered to meet the expectations of adolescents. The internet self-efficacy scale developed in this research can help the students to know their ability and skills to use internet resources.

METHODOLOGY

Participants

The research population constitutes secondary school students of Amritsar city in Punjab. As the entire population cannot be reached, so random sampling method was used to determine the sample. Three hundred and fifty (350) students were chosen.

Construction of Internet Self-efficacy Scale (ISES)

The detail of the steps or phases followed for the construction and standardization of the scale has been discussed below:

Planning Phase

During the planning phase, following points were considered:

- Whom to administer on?
- What to measure?

On the basis of above mentioned aspects, it was decided that, Internet self-efficacy scale was meant for students of age group 14-16 years studying in class ninth and tenth in different schools of Amritsar district. Efficiency of using the internet resources was to be measured in terms of the knowledge, understanding and application. Keeping in mind the above said aspects, planning for constructing and standardizing the internet self-efficacy scale was done. It involved the following two steps:

Identification of Contents

For the present study, the contents were identified after reviewing the literature from various sources like books, journals, dissertation abstracts, websites, e-journals and e-books. Thorough discussion with subject experts also helped in identifying concepts.

Identification of Objectives

Keeping in mind the content of internet self-efficacy scale, objectives were identified by the investigator for the construction of the internet self-efficacy scale. In the present paper, the scale

was mainly meant to test knowledge of students related to different areas of internet. These areas are Internet Knowledge, Information Retrieval and Provision, Communication and Manipulation, Instant messenger, Audio, Video and image sharing.

Construction Phase

The construction phase involved preparation of preliminary draft, editing of test items, try out of the first draft, item analysis, preparation of final draft and scoring procedure.

Preparation of Preliminary Draft

For testing the objectives, the investigator prepared a preliminary draft of internet self-efficacy scale comprising 55 statements in total. Scale statement (items) were prepared in 5 Likert type responses (where "5" is Strongly Agree (SA), "4" Agree (A), "3" Not Sure (N), "2" Disagree (DA) and "1" Strongly Disagree (SDA). In this preliminary draft, the scale was divided into two parts. The first part consisted of the items for determining the demographic information of the participants, whereas the second part consisted of statements related to internet self-efficacy.

Editing of the Test Items

This preliminary draft of internet self-efficacy scale comprising 55 statements was given to experts to critically analyze the items for the content and language, correct ambiguities if any, check that all the defined objectives were tested and to suggest any other relevant question that may be included.

The experts were personally requested by the investigator to go in for serious reflection over every statement and to indicate how the statements were relatively close to the said objectives. The investigator with her supervisor devoted several sittings to consider the judgments of the experts on the statements. Discussions with the individual subject teachers/experts were held separately. On the basis of suggestions made by experts, the preliminary draft was rephrased to prepare the first draft by dropping 10 statements and modifying a few with a view to ensure greater reliability. The items were rearranged in logical order. Thus, the first draft comprised of 45 statements.

Pilot Study

The first draft prepared by the researchers was applied randomly to 50 secondary school students of grade ninth and tenth. The necessary instructions were read to respondents. It was emphasized that they should read each statement very carefully and put a tick mark under the category, which in their opinion best expressed their feelings about the statement. Each category carries the 5, 4, 3, 2and 1 scores respectively. As there is no right or wrong response so they could ask questions and make suggestions in case of any unclear parts in the statements. The objective of pilot study was to know whether there were ambiguous statements that needed clarification and whether objectives were realized. The answer scripts were evaluated with the help of the scoring key. Item pool was finalized consisting of 33 statements in total.

Data Collection

The internet self-efficacy scale was administered to 300 participants.

Item Analysis

In order to make selection of items objectively and scientifically, item analysis was done. Item analysis is the process to evaluate the effectiveness of items in a test by exploring the examinees' responses to each item (Rovai et al. 2014). Item analysis of test is primarily done to find out ambiguities, clues, ineffective distracters and technical defects that might have been overlooked during test construction. For analyzing the statements, twenty-five percent of the subjects with the highest total scores and twenty-five percent with the lowest total scores were taken. As per Edwards (1957), these two groups will serve as criterion groups for evaluating the individual statements and t-value was calculated for these groups. The value of t differentiates between the high and low groups. T-value equal to or greater than 1.75 indicates that average response of the high and low groups to a statement differs significantly. Finally, statements with the value greater than or equal to 1.75 ($t \geq 1.75$) were selected for the final draft of scale.

RESULTS

In the present study, t-test of item analysis was used for selecting and eliminating the state-

ments of internet self-efficacy scale. On the basis of scores obtained by the respondents on all 33 statements, the scores were arranged in descending order. Then top twenty-five percent with the highest total scores on the scale and the bottom twenty-five percent with the lowest total scores on the scale were extracted out to form two criterion groups in order to evaluate each individual statement of the scale as suggested by Edwards (1957). Afterwards, mean and standard deviation were computed for each individual statement separately for top twenty-five percent and bottom twenty-five percent of the students. Finally, the t-values for all the 33 statements were calculated and only those statements were retained for the final draft of internet self-efficacy scale which were having t-value equal to or greater than 1.75 (Edwards 1957). Thus, on the basis of this, out of 33 statements, 16 statements were weeded out and remaining 17 statements were selected for final form of internet self-efficacy scale which can be used to determine the internet related ability and skills of secondary school students so that the students' e-skills to handle online resources can be assessed.

Reliability

When a test yields the same results on repeated trials then that test is said to have reliability. Reliability is often measured with a reliability coefficient. In the view of Nunnally (1982) reliability co-efficient can be calculated in threeways that is test-retest reliability, split half reliability and alternate forms reliability. In the present study, the reliability co-efficient of the internet self-efficacy was calculated by test-retest method. The product moment coefficient of correlation for the two scores was computed. The coefficient of reliability between two scale scores was found to be 0.89. This coefficient of correlation is fairly high, which testifies the soundness of the test.

Validity

In the present study, the content validity was established for the internet self-efficacy scale. The content validity is a non-statistical type of validity. Content validation was done in the process of scale development. A scale has content validity if the chosen statements comply with the scale specification which is done keeping in view the subject domain. To determine the content validity of the internet self-efficacy scale, computer teachers/ experts were given this test individually to review the scale items and comment on whether each item appropriately matched to the content area and objectives specified. As the table of specifications and the items were found to match adequately, the content validity of the internet self-efficacy was ascertained.

Preparation of Norms

The range of the scores for internet self-efficacy scale was determined by calculating mean and S.D. The mean and S.D. in the present paper is as given below:

Mean= 66.39

S.D. = 12.5

On the basis of mean and S.D., following norms are prepared:

Mean + S.D. = 66.39 + 12.5= 78.89 (High level of internet self-efficacy)

Mean – S.D. = 66.39 - 12.5= 53.89 (Low level of internet self-efficacy)

The scores between 78.89 and 53.89 refers to Average level of internet self-efficacy

From the above discussion, it is clear that students who will score equal to and more than mean + S.D (78.89) are more confident in online environment and put in the category of high level of internet self-efficacy. Students with scores equal to and less than mean - S.D (53.89) will belong to the category of low level of internet self-efficacy. The scores of students between the mean + S.D and mean – S.D (78.89 and 53.89) indicate that they have moderate internet self-efficacy.

DISCUSSION

Technology has brought revolutionary changes in the field of education. So, it becomes necessary that each and every adolescent must be equipped with the knowledge of computer and ability to use internet. They must have self-efficacy towards internet so that they can easily learn in web based environment. Internet self-efficacy scale is a good instrument for knowing the independent control of students using internet and their capacity of communicating and interacting in internet-based environments (Kuo

2010). High attitude towards computer may develop higher internet self-efficacy. Training will help in the improvement of learners' internet self-efficacy, especially for those with higher attitudes toward computers and those with low computer anxiety (Torkzadeh and Van 2002; Torkzadeh et al. 2006).

Studies have shown that there is correlation between internet self-efficacy and performance. High performance in synchronous/asynchronous environment leads to student satisfaction. Students are found to show satisfaction if they are given internet experiences in a class (Lim 2001). Joo et al. (2000) and Thompson et al. (2002) revealed that internet self-efficacy is also a positive predictor of students' performance. Students with high internet self-efficacy have better information retrieval skills and show better learning outcomes than their counterparts (Tsai and Tsai 2003). Ability to use internet will not only result in good academic performance rather use of internet in full consciousness and correctly by the students will make them competent in internet security (Ercag and Karabulut 2017).

For creating a constructivist learning environment by utilizing the resources of the web, it is very essential to seek insight into the relationship between internet self-efficacy and internet anxiety (Paul and Glassman 2017). As internet self-efficacy moderates the relationship between internet anxiety and internet identification so educators and parents should identify students' level of internet self-efficacy and encourage them to gain more knowledge and training about internet usage to boost their internet self-efficacy accordingly (Hsiao et al. 2017). Several measures for internet self-efficacy exist. Miltiadou and Yu (2000) established the Online Technologies Self-Efficacy Scale (OTSES) to evaluate online students' self-efficacy beliefs about communication technologies required for interaction and participation in an online course, such as email, Internet, and computer conferencing. An eight-item measurement for Internet self-efficacy was developed by Eastin and LaRose (2000). Torkzadeh and Van (2002) and Torkzadeh et al. (2006) developed the internet self-efficacy instrument that mainly determines individual's self-perception and self-competency in interacting with the internet.

The researchers developed an internet self-efficacy scale (ISES) for secondary school students. In the age of digitalization, it becomes mandatory that adolescents must be equipped with the ability of using internet. The reliability and validity of the scale was tested in this research and the scale is found to be highly reliable and valid. The scale consists of 17 items and related to 5 areas of internet. The five areas assess the student's knowledge towards internet, information retrieval skill, communication and manipulation skills in the internet based environment, ability to use instant messenger, audio, video and image sharing.

CONCLUSION

In this research, an internet self-efficacy scale with high validity and reliability was constructed. The internet self-efficacy scale consists of a total number of 17 items and is meant to test the knowledge and ability of students in different areas of internet (5 areas). The five areas in the scale are Internet Knowledge, Information Retrieval and Provision, Communication and Manipulation, Instant Messenger, Audio, Video and Image Sharing. This is the first study, which has been undertaken with the aim of evaluating the degree of self-efficacy of secondary school students towards internet in Amritsar District of Punjab. There were no previous studies that have evaluated the internet ability of students at this level.

RECOMMENDATIONS

Researchers can use the Internet Self-efficacy Scale (ISES) or can modify it as per their requirements as the scale developed in this study can help them to determine the internet ability of the students. Teachers can also give assignments or projects to the students as per the students' self-confidence towards internet and they may even give them the requisite training in improving their ability to use internet.

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