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Web 2.0 Tools and Educational Usage Self-Efficacy: A Scale Development Study

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Abstract

The purpose of this study is to develop a valid and reliable scale for Web 2.0 Tools and Educational Usage Self-Efficacy. The experts were consulted for content validity. However a factor analysis was held for structure validity. The considering the 57-item scale in total, the scale was found to have an eight-factor structure. The factor loading of 57 items changes between 0.62 and 0.88. The eight factors of the scale explain 76.09% of the total variance. To examine the reliability of the scale, internal consistency coherence is calculated. The internal consistency of the 57-item Web 2.0 Tools Self-Efficacy Belief Scale was 0.97. These values show that the scale is reliable and it validates.

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Key Words: Web 2.0 Tools, Educational Usage, Self-efficacy. Introduction

1. Introduction

Web 2.0 is a concept which is used to express the second generation web tools that differ from the first generation of web tools with different features. The concept of Web 2.0 appeared in a conference session and the first one was used by Tim O'Reilly (O'Reilly, 2005) O'Reilly revealed the Web 2.0 as the new instruments which make people use the internet actively in a participated/contributed space and structure. The professionals, experts, students and ordinary citizens can contribute to Wiki by adding content, may participate in social networking, create digital video and music and contribute to blogs (Nelson, Christopher and Mims, 2009). Today, it can be observed that more than 50% of the internet users of Asian countries, almost 30% of the internet users of U.S.A and 20-25% of the European internet users are using the tools such as weblogs, wikis, podcasting, online games and social bookmarks (Pascu, 2008).

In Anderson's (2007) study, it is seen that the use of Wiki provides the students an opportunity of reflecting others and their own studies and making comments on them. In Ramanaua and Geng's (2009) research, the using rate of Wikis were found pretty low, students prefer personal diaries instead of Wikis and it is also observed that students use Wikis more than the social bookmarking tools. The students in Hartshorne and Ajjan's research (2009) expressed that some of Web 2.0 applications are effective on increasing the of the course satisfaction, learning, writing skills and the level of interaction with the other students. Kamel Boulos and Wheeler (2007) defined 30 various Web 2.0 sites which consist of social networks, file sharing and gaming sites those are used by students in

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their research. Again, it is found that the students who participated in the research -except only two of them- use more than one of Web 2.0 tools.

Some sort of cognitive and personal characteristics are required while using Web 2.0 tools, particularly Wikis. Writing and editing, group processes and web skills stand out among the cognitive abilities while self-regulation, integrity and openness stand out among the personal characteristics (West and West, 2009). Besides all these variables above, self-efficacy is one of the most significant of all which enables these tools to be used. According to Bandura (1997), self-efficacy is the capability belief towards the actions those are required in managing and editing lessons which bring skills. Measuring self-efficacy presents us the information about how people think, feel, behave and motivate themselves. In addition to that, this gives an opportunity to make an inference about a better understanding the results of the behaviors, persevering, resistance, effort, thought patterns, elements which influence the choices and emotional reactions (Bandura, 1997). In related literature, limited number of self-efficacy scales for Web 2.0 tools are encountered. Davis, Wright, Coleman and MacCall (2007) used a Likert type scale which consists of an adaptation of the computer self-efficacy scale –developed by Compeau- to weblogs. Davis (2009) adapted Compeau and Higgins’s self-efficacy scale for technology in order to define self-efficacy belief for Web 2.0 tools. This scale is intended to determine library science students’ self-efficacy beliefs towards Web 2.0 tools. Klassen (2004) found in his research which covers 20 studies that self-efficacy belief is influenced from culture. In this respect, it can be assumed that scales which are developed in a particular culture cannot be functional in every culture type.

A tool is needed that measures how much Web 2.0 tools, which have many benefits in terms of educational aspects, are used by teacher candidates and measures what their self-efficacy beliefs are. It is also needed to examine the results those are obtained from this tool which is mentioned above. The purpose of this research; developing a scale to determine teacher candidates’ self-efficacy beliefs for Web 2.0 tools and revealing teacher candidates’ level of use of these tools.

2. Method

2.1. Sample

Of 2885 pre-service teachers at Sakarya University Faculty of Education, 577 of them were selected as a sample. 575 of scale were completed by the teacher candidates and they were included in the research data. The sample consisted of 334 (58.1%) females and 241 (41.9%) males. As it was seen approximately 50 % of teacher candidates stated that they have never used Podcast, RSS, and SMT. While the usage of weblog and wiki were lesser, IM, Facebook, and ISS were mostly used as it was expected.

2.2. Instrument

"Web 2.0 Tools for Self-Efficacy Scale" was developed by the researchers. While developing scale, first of all the item depository was created by making a literature review and interviews with teacher candidates. Item depository was consisted of 60-items using a 5-point Likert-type scale, which are "I strongly agree (5), I agree(4), neutral(3), I disagree (2) and I strongly disagree(1)".

In the reliability and validity studies, experts were assigned who are consulted for context and aspect. The scale was presented to 8 academicians of Educational Technology, Measurement and Evaluation in Education and Turkish Language departments and their opinions were taken. In accordance with opinions and critics of these experts, necessary corrections and substitutions were made and scale was constructed with 58 items and validity and reliability studies were conducted with these items.

For structure validity and reliability studies, the scale was applied to study group. Firstly exploratory factor analysis was conducted with the data obtained from the scale for the construct validity. Item-factor structure which is obtained from exploratory factor analysis (EFA) has been tested for model consistency with confirmatory factor analysis (CFA). Reliability of the scale was examined with the internal consistency coefficient and test-retest.

2.3. Data Collection and Analysis

In this research, data were obtained from "Web 2.0 Tools for Self-Efficacy Scale". Scales were collected by hand and applied to teacher candidates face-to-face by researchers. Data collected from 575 teacher candidates were entered into SPSS 13.0 package program. After analyzing the data, exploratory factor analysis, internal consistency coefficients, test-retest and inter-item correlation coefficients were calculated by using SPSS 13.0 package program and for confirmatory factor analysis LISREL 8.54 package program was used.

3. Findings

3.1. Exploratory Factor Analysis

For construct validity of Web 2.0 Tools for Self-Efficacy scale first of all, exploratory factor analysis was conducted. In order to do this, first of all KMO test was checked to test efficacy of samples. KMO value was found to be .96. According to Green and Salkind (2007), since this value is greater than .70, factor analysis can be done using these data. Secondly, by examining Bartlett's Sphericity test ($\chi^2 = 34406.307$, $p=.000$), data were accepted as appropriate to make factor analyses because it shows significant differences.

In factor analyses, it was paid attention 58 items to have eigen values equal to 1, factor loadings of items to be at least .30, items to load in a single factor and at least .10 point difference to occur if any item is loaded in two different factors. Meanwhile, 25 decrees varimax rotation was done while analyzing construct validity. The results of validation study indicated that there are eight domains/factors in the scale.

Exploratory factor analysis revealed that the number of factors that have eigen values greater than one in the scale, as it can be seen in the scree plot graph, is eight. Eight factor structure was preferred after the examination of scree plot graph since the values were not close to each other in the graph and the breaking points were different. After deciding the factors in the scale, the factor loadings of the items were investigated. Since the first item of the scale has loadings in both first and eighth factor and the factor loading difference is less than .10, this item was dropped from the scale and explanatory factor analysis was conducted with 57 items again.

As a result of exploratory factor analysis that was conducted with 57 items, KMO value was found to be .96. Since the KMO value is greater than .70, it was concluded that the factor analysis can be performed with the data. Bartlett Sphericity test results ($\chi^2 = 33730.813$, $p=.000$) also indicated that factor analysis can be conducted over the data collected. In factor analysis, taking in to consideration both 57 items to have eigen values equal to 1 and principle component analysis results, 25 decrees varimax rotation was done. Validity analysis results also revealed that the scale has eight factors.

Self-efficacy belief regarding Web 2.0 tools scale is composed of eight factors. The first factor contains the following items, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14. An example item for that domain/factor is "*I can create a personal page with blogs*". The factor loadings of 13 items included in that domain, change between 0.66 and 0.81. This factor explains 37.6% of the total variance was titled as "*weblogs and educational usage*".

The second factor contains the following items, 36, 37, 38, 39, 40, 41, 42, 43 and 44. An example item for that domain/factor is "*I can support collaborative learning by instant messaging*". The factor loadings of 9 items included in that domain, change between 0.80 and 0.84. This factor explains 12.13% of the total variance was titled as "*Instant messaging and educational usage*".

The third factor contains the following items, 15, 16, 17, 18, 19, 20, 21, 22 and 23. An example item for that domain/factor is "*I can share information about various topics in wikis*". The factor loadings of 9 items included in that domain, change between 0.68 and 0.77. This factor explains 7.24% of the total variance was titled as "*Wiki and educational usage*".

The fourth factor contains the following items, 29, 30, 31, 32, 33, 34 and 35. An example item for that domain/factor is "*I can collect students' products on a single page with RSS*". The factor loadings of 7 items included in that domain, change between 0.76 and 0.84. This factor explains 5.66% of the total variance was titled as "*RSS and educational usage*".

The fifth factor contains the following items, 45, 46, 47, 48, 49 and 50. An example item for that domain/factor is "*I can conduct classroom discussions by using facebook*". The factor loadings of 6 items included in that domain, change between 0.81 and 0.88. This factor explains 4.46% of the total variance was titled as "*Facebook and educational usage*".

The sixth factor contains the following items, 24, 25, 26, 27 and 28. An example item for that domain/factor is "*I can transfer audio data that was downloaded via podcasts to portable devices*". The factor loadings of 5 items included in that domain, change between 0.81 and 0.88. This factor explains 3.56% of the total variance was titled as "*Podcast and educational usage*".

The seventh factor contains the following items, 55, 56, 57 and 58. An example item for that domain/factor is "*I can organize a bookmark with social marking tools*". The factor loadings of 4 items included in that domain, change between 0.80 and 0.82. This factor explains 2.87% of the total variance was titled as "*social marking tools and educational usage*".

The eighth factor contains the following items, 51, 52, 53 and 54. An example item for that domain/factor is “*I can present sample videos for lesson in Video-sharing sites*”. The factor loadings of 4 items included in that domain, change between 0.62 and 0.84. This factor explains 2.57% of the total variance was titled as “*image sharing sites and educational usage*”.

Considering the 57 items scale in total, it was found the scale to have eight factor structure. Factor loadings of 57 items change between 0.62 and 0.88. The eight factors of the scale explain 76.09% of the total variance. These results indicate that the scale explains well the pre-service teachers’ self-efficacy belief regarding Web 2.0 tools. Confirmatory factor analysis was performed to investigate the goodness of model data fit.

3.2. Confirmatory Factor Analysis

Fit indexes of the 57 item scale that contains eight factors were tested by confirmatory factor analysis. Confirmatory factor analysis was carried out with the first and second order analysis. Web 2.0 Tools Self-Efficacy Belief Scale’s first order confirmatory factor analysis results presented the following fit indexes, $\chi^2= 4167.47$ (df=1511, p=.000), $\chi^2/df=2.76$ RMSEA= 0.055, GFI= 0.80, AGFI= 0.78, CFI= 0.93, NFI=0.89 and NNFI= 0.92. According to modification suggestions obtained after the first order confirmatory analysis, it was decided to do the suggested modifications between the following items, 2 and 4, 5 and 6, 15 and 16. The fit indexes were $\chi^2= 3862.15$ (df=1508, p=.000), $\chi^2/df=2.56$ RMSEA= 0.052, GFI= 0.82, AGFI= 0.80, CFI= 0.93, NFI=0.90 and NNFI= 0.93 after doing the aforementioned modifications. Modifications done in the model improved χ^2 and fit indexes.

As a result of the second order CFA, when it is considered whether factors defined explain the self-efficacy belief regarding Web 2.0 tools latent variable, it was found all the factors to explain well the latent variable which is self-efficacy belief regarding Web 2.0 tools. The fit indexes found after the analysis are as follows, $\chi^2= 4571.53$ (df=1531, p=.000), $\chi^2/df= 2.99$ RMSEA= 0.059, GFI= 0.78, AGFI= 0.76, CFI= 0.92, NFI=0.88 and NNFI= 0.92. According to modification suggestions obtained after the second order confirmatory analysis, it was decided to do the suggested modifications between the following items, 36 and 37, 43 and 44, 49 and 50. The fit indexes were $\chi^2=3918.78$ (df=1525, p=.000), $\chi^2/df=2.57$ RMSEA= 0.052, GFI= 0.82, AGFI= 0.80, CFI= 0.93, NFI=0.90 and NNFI= 0.93 after doing the aforementioned modifications. Modifications done in the model improved χ^2 and fit indexes.

Several fit indexes were considered such as χ^2 , RMSEA, GFI, CFI, NNFI while deciding whether the data fits to models constructed by CFA (Anderson & Gerbing, 1984; Sümer, 2000). If χ^2/df ratio is equal or less than 5, it can be concluded that the model fits the data well. Similarly, RMSA value equal or less than 0.08 can be treated as an indication of model data fit. Byrne (1998) indicated that for good model data fit, RMR and SRMR values should be equal or less than 0.10. Similarly obtaining .90 or greater values for CFI, NFI and NNFI indicates a good model. Moreover, .80 or greater values for AGFI; .85 or greater values for GFI are an indication of a good model data fit (Anderson and Gerbing, 1984; Sümer, 2000). When fit indexes of the scale are investigated it was observed that the fit indexes are in an acceptable range. According to these results it can be concluded that the scale has construct validity. Internal consistency and test-retest correlation coefficients were calculated in the reliability analysis.

Sensitivity, consistency and stability of the Web 2.0 Tools Self-Efficacy Belief Scale were investigated in the reliability analysis. For sensitivity of the scale expert opinion were taken. The expert opinion results indicated that the scale is sensitive enough in measuring the quality that it was purposed to measure. Internal consistency coefficient (alpha) was investigated for consistency of the scale and test-retest procedure was followed for stability of the scale.

Internal consistency of 57 item Web 2.0 Tools Self-Efficacy Belief Scale was .97. Internal consistency coefficients for the domains/factors were as follows: “Blogs and educational usage” .96, “instant messaging and educational usage” .96, “Wiki and educational usage” .95, “RSS and educational usage” .97, “Facebook and educational usage” .95, “Podcast and educational usage” .95, “Social marking tools and educational usage” .95, “Visual sharing sites and educational usage” .92.

Test retest procedure was followed for stability of the scale. The data related to test retest reliability were collected by administering the scale to 70 students two times where second administration of the scale was two weeks later than the first administration. Data obtained from 70 students were analyzed by Pearson Product Moment correlation analyzes. Correlation coefficient was .91 which is a high correlation and presents that the stability of the scale is high.

3.3. Correlation Coefficients among Factors of the Scale

The correlations among Web 2.0 Tools Self-Efficacy Beliefs Scale and its factors were analyzed by Pearson Product Moment correlation analyzes. It was observed that the correlations among the total scale point and factors' total points change in between .50 and .82 and correlations were significant at .01 level. Moreover, the correlations among factor points were changing between .13 and .63 and correlations were significant at .01 level.

4. Conclusion and Discussion

Nowadays, Web 2.0 tools are among quite common utilized internet tools. Use of Web 2.0 tools in education has become rather common tools. Increasing the use of Web 2.0 tools in education has teacher candidates require knowledge and skills directed towards these tools. The self-efficacy that is intended for these tools constituted the foundation of the knowledge and skills. The self-efficacy of teachers and teacher candidates for Web 2.0 tools can be obtained with the scale that is formed personal reporting like the other self-efficacy (Bandura, 2001).

When the literature is examined, two studies for Web 2.0 about self-efficacy scale for Web 2.0 tools are seemed. Both of them adapted self-efficacy scale for computer technology to Web 2.0 tools. With this aspect, a self-efficacy which deals with Web 2.0 tools' features and use in educational environments were needed to develop. Another reason of development of the new scale instead of adapting the existing scale is the emergence of differences among cultures in terms of self-efficacy (Klassen, 2004). Because of the fact that the existing scales have been developed in Western culture and self-efficacy in non-Western culture societies give different results from Western culture, the new scale was developed.

For the self-efficacy scale that is intended for Web 2.0 tools, the first eight-factor structure was obtained with exploratory factor analysis. The structure that was obtained by exploratory factor analysis, the model consistency with confirmatory factor analysis has been tested. In/on Reliability and validity of the scale, aspect, scope, and construct validity, sensitivity, consistency, reliability of stability are ensured. The scale that was developed is seen as a more comprehensive scale that includes both the scale when it was compared to the scales in the literature. The self-efficacy for the weblog in research of Davis, Wright, Coleman and MacCall has quality to meet a factor that was developed in his study. The self-efficacy scale of Davis (2009) for Web 2.0 tools includes the Weblogs, Wiki, social networking, video sharing, social tags, social bullet and social cataloging factors. The developed scale does not involve only the social cataloging. The reason is that Davis (2009) research is a scale developed for students of librarianship. The developed valid and reliable scale has quality to be used as a scale for measuring the self-efficacy for Web 2.0 in the literature. Being put forward the belief of the self-efficacy for Web 2.0 tools using the scale is thought to be used to examine whether it is different in terms of demographic factors.

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