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Exploring teachers' concerns toward implementing Internet-based learning: The role of Internet self-efficacy

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Abstract: The purpose of this study was to unveil Taiwanese junior high school teachers' concerns toward the implementation of Internet-based learning with relations to their perceived Internet self-efficacy. The Stages of Concern (SoC) questionnaire and Internet Self-efficacy (ISS) Survey were utilized to assess teachers' current concerns toward Internet-based learning and their Internet self-efficacy, respectively. A total of 243 junior high school (grade 7 to grade 9) teachers in Taiwan were invited to complete the two above-mentioned instruments. The results show that, first, three distinct teacher clusters were found based on their SoC questionnaire scores via k-means clustering analysis. In addition, teachers with higher Internet self-efficacy showed their concerns toward implementing IBL on higher stages. More specifically, teachers who concerned more in the lower stages tended to possess higher basic Internet self-efficacy. However, only those who concerned more in the higher stages showed higher advanced Internet self-efficacy.

Keywords: Internet-based learning, Internet self-efficacy, stages of concern, teachers

1. Introduction

Although some studies have emphasized that teachers' attitude is one of the major factors that influence their adoption of technologies or implementation behaviors in the classroom (e.g. Sugar, Crawley, & Fine, 2004), limited research results have been reported regarding teachers' concerns toward implementation IBL in the classroom. The development of concern theory suggests that different teachers have different concerns and need different interventions. Therefore, identifying teachers' stages of concern is necessary in order to provide appropriate support and assistance to facilitate the adoption. Furthermore, the process of implementing IBL would be more effective and successful if teachers' concerns are considered and scrutinized. In addition, since the promising educational applications of IBL, more studies are needed to investigate teachers' concerns of implementing IBL. The Stages of Concern (SoC) was developed to explore the educators' and administrators' concerns of an educational innovation during the educational change process (Hall & Hord, 1977). Accordingly, the present study attempted to adopt the SoC theory to identify teachers' concerns toward IBL.

As Overbaugh and Lu (2008) pointed out, one of the determinant factors that relates to a teacher's stages of concern is his or her confidence, namely, self-efficacy in adopting an innovation. Several researchers have stressed that teachers' self-efficacy has more or less impact on their adoption or implementing related teaching practice (e.g., Lee & Tsai, 2010). In addition, only a handful of research results have explored the relationship between individuals' self-efficacy and their concerns of implementing an innovation in

educational contexts (e.g., Boz & Boz, 2010). It is implied that teachers' Internet self-efficacy may affect their concerns on usages of Internet-based learning in their implementation of Internet-based learning in the formal education. Therefore, one of the purposes in present study was to explore the relationships between teachers' Internet self-efficacy and their concerns toward implementing IBL.

In sum, the research questions in this study were as follows:

- What concerns toward implementation of IBL do the junior high teachers have?
- What are the relationships between the teachers' perceived Internet self-efficacy and their concerns toward IBL implementation?

2. Method

2.1 Participants

The sample of current study included 243 junior high school (grade 7 to grade 9) teachers in Taiwan. They came from eight different junior high schools across various demographic areas in northern and southern Taiwan and were chosen based on the percentages of the population distributions of the junior high school teachers in all city/county districts of Taiwan (Ministry of Education [MOE], 2010). Among these sample subjects, 72 (30.8%) were male and the remainder of 162 (69.2%) were female.

2.2 Instrument

The Stages of Concern (SoC) questionnaire designed by Hall, George and Rutherford (1977) was utilized to measure and understand teachers' current concerns toward Internet-based learning. Within each of the seven stages of concern, there are 5 statements, for a total of 35 items to which the participant responds. The wording of "the innovation" in each statement was replaced by the wording of "the Internet-based learning". For instance, one of the original statements "I am not concerned about the innovation (Stage 0, awareness)" was modified to "I am not concerned about the Internet-based learning". A five-point Likert scale of modified SoC questionnaire consisted of 35 items was administrated, ranging from ''not true of me now'' (1) to ''very true of me'' (5). The detailed descriptions of each stage and sample items are as follows:

- Awareness: teachers have little awareness or concern for IBL implementation.
- Informational: teachers have general or vague awareness of IBL implementation. Teachers may begin some information seeking to gain additional knowledge about IBL implementation.
- Personal: teachers' concerns are about the personal costs of implementation IBL.
- Management: teachers' concerns will focus around how to integrate the logistics of IBL into their daily jobs.
- Consequence: Teachers' concerns are mainly on the impact of the IBL on their students.
- Collaboration: teachers begin to have concerns about how they compare to their colleagues and how they can work with their fellow teachers on IBL implementation.
- Refocusing: teachers' concerns such as making adjustments, proposing alternatives and others to improve the current IBL practice.

In addition, for the further analysis and interpretations in the current study, the reverse items of the "Awareness (5 items)," "Informational (1 item)," and "Management (5 items)" scales were coded in reverse. Hence, teachers with higher scores in the above-mentioned three scales held higher awareness toward IBL (Awareness), were willing to know more about IBL implementation (Informational), and represented that they

can manage IBL-related issues well (Management). As for the "Personal," "Consequence," "Collaboration," and "Refocusing" scales, teachers with higher scores in these scales represent that they concerned more about the issues such as issue related to themselves while implementing IBL (Personal), the impacts on their students (Consequence), collaboration with others (Collaboration), and revising the current IBL practice (Refocusing).

Furthermore, in order to assess teachers' Internet self-efficacy, the second instrument, Internet Self-efficacy Survey (ISS), was utilized. The ISS was modified based on existing questionnaires (Kao & Tsai, 2009) including a total of 16 items and two scales: basic and advanced Internet self-efficacy scales. The items of each scale were presented with bipolar ranging from strongly confident (5) to strongly unconfident (1) statements on a five-point Likert scale. Teachers who scored higher in both scales of ISS represents that they perceived themselves as possessing higher basic Internet self-efficacy and advanced Internet self-efficacy. The detailed descriptions of two scales are as follows:

- Basic self-efficacy scale: measuring teachers' self-perceived confidence and abilities of operating basic Internet functions. One of the sample items in this scale is "I feel confident about searching for information on the Web using keywords'"
- Advanced self-efficacy scale: measuring teachers' self-perceived confidence to engage themselves in online interaction or advanced usage of the Internet. A sample item of this scale is "I feel confident about making payments on the Internet"

3. Results

3.1 Factor analysis

To validate SoCQ, an exploratory factor analysis with the varimax rotation method was performed to clarify its structure. An item was retained only when its factor loading was greater than 0.5. As a result, the participants' responses were grouped into six orthogonal factors, which were: "Awareness", "Personal", "Management", "Consequence", "Collaboration" and "Refocusing". Yet, "Informational" items were not grouped into the corresponding scale. The eigenvalues of each factor from the principle component analysis was larger than one and an item with a factor loading of greater than 0.50 was retained from the instrument. Therefore, the initial 35 items were reduced to 25 items. A total of 76.56% variance was explained by these six scales. The reliability coefficients for these six scales were ranging from 0.75 to 0.93 and the overall reliability coefficient was 0.86, suggesting that these scales are adequately reliable to measure teachers' concerns of implementation of IBL. Teachers attained highest score on the "Consequence" scale (M = 4.01, S.D. = 0.81), followed by "Personal" (M = 3.89, S.D. = 0.89), "Collaboration" (M = 3.83, S.D. = 0.78), "Refocusing" (M = 3.46, S.D. = 0.84), "Awareness" (M =3.45, S.D. = 1.01), and "Management" (M = 2.56, S.D. = 0.84).

To clarify the structure of ISS instrument, the same procedures and methods were used. Thus, the initial 16 items were reduced to 14 items, with two factors: "Basic self-efficacy" and "Advanced self-efficacy." A total of 64.69% variance was explained by the two scales. The reliability coefficients for these factors were 0.86 and 0.92 respectively, and the overall alpha value was 0.90, indicating that these factors were sufficiently reliable for measuring teachers' perceived Internet self-efficacy. In addition, the teachers scored highest on the "Basic self-efficacy" factor (M = 4.69, S.D. = 0.47), followed by the other factor "Advanced self-efficacy" (M = 3.66, S.D. = 1.16).

3.2 Clustering teachers' stages of concern toward Internet-based learning

On the basis of teachers' scores for SoC questionnaire, a k-means clustering analysis

method was employed to classify teachers into distinctive groups. The three-cluster solution was selected and yielded the significant distinctions in the six stages of concern among each group (F = 26.84~112.45, $p < 0.001$). As shown in Table 1, the number of participants and mean values of stages of concern toward IBL in each cluster. By comparing the mean score of each cluster with the total mean score of teachers via t-tests, the attributes of each cluster were identified.

Table 1. The clusters of teachers' SoC toward implementing IBL

Scales	Cluster 1 (Higher SoC) (n = 131) Mean (S.D.)	Cluster 2 (Lower SoC) (n = 25) Mean (S.D.)	Cluster 3 (Lowest SoC) (n = 78) Mean (S.D.)	F (ANOVA)
Awareness	3.80 (0.88) (+)	4.15 (0.79) (+)	2.64 (0.77) (-)	57.13***
Personal	4.37 (0.54) (+)	2.43 (1.08) (-)	3.56 (0.60) (-)	112.45***
Management	2.45 (0.83)	3.61 (0.73) (+)	2.40 (0.65) (-)	26.84***
Consequence	4.38 (0.52) (+)	2.55 (0.79) (-)	3.86 (0.61) (-)	108.05***
Collaboration	4.29 (0.47) (+)	3.02 (0.85) (-)	3.33 (0.66) (-)	90.34***
Refocusing	3.86 (0.60) (+)	2.76 (0.78) (-)	3.02 (0.83) (-)	48.83***

*** $p < 0.001$

Note: The sign (+) represents the mean was significant higher than total mean while the sign (-) represents the mean was significant lower than total mean.

The teachers in the cluster 1 (higher SoC) represents that their mean scores in all stages were significantly higher than the total mean scores (t = 4.62~11.06, $p < 0.001$) except the "Management" stage, which means that cluster 1 teachers expressed stronger concerns in most of the stages, particularly those higher stages such as "Consequence," "Collaboration," and "Refocusing" concerns. Next, in the cluster 2 (lower SoC), teachers' mean scores in the "Awareness," and "Management" stages were significantly higher than the total mean scores (t = 4.43, 7.20, respectively, $p < 0.001$). In addition, the mean scores in other stages including "Personal," "Consequence," "Collaboration," and "Refocusing" were significantly lower than the total mean scores (t = -9.23~ -4.49, $p < 0.001$), indicating that these teachers showed stronger concerns in the lower stages (i.e., "Awareness" and "Management"). Finally, teachers in the cluster 3 (lowest SoC), their mean scores on the each stage were significantly lower than the total mean scores (t = -9.28~ -2.12, $p < 0.05$), suggesting that the teachers in cluster 3 showed lowest concerns in all stages.

3.3 Teachers' Internet self-efficacy among different cluster groups

In this study, the relationship between teachers' stages of concern (divided into three clusters, as shown in Table 1) toward IBL and their Internet self-efficacy was explored. A series of ANOVA test analyses were employed to reveal the relationships between teachers' Internet self-efficacy and their stages of concern toward IBL. The results of the ANOVA analyses reveal that there are significant differences among the three clusters on the factors of "Basic self-efficacy" (F = 7.07, $p < 0.01$), and "Advanced self-efficacy" (F = 9.02, $p < 0.001$). A series of *post hoc* tests (Scheffe tests) were also conducted to make comparisons among the three clusters. In the scale of "Basic self-efficacy", the results indicated that teachers in cluster one (higher SoC) had a significant higher score than those in cluster three (lowest SoC) (4.76 versus 4.54, $p < 0.01$). In addition, teachers in the "lower SoC" cluster scored significant higher than those in the "lowest SoC" cluster (4.84 versus 4.54, $p < 0.05$). In the scale of "Advanced self-efficacy", the teachers in the "higher SoC" cluster also had a significantly higher score than those in the "lowest SoC" cluster

(3.89 versus 3.22, $p < 0.001$). Accordingly, teachers expressed stronger concerns in the lower stages (i.e., higher SoC and lower SoC clusters) might perceive themselves with higher basic Internet self-efficacy. Yet, only teachers showed stronger concerns in the higher stages (i.e., higher SoC cluster) might possess higher advanced Internet self-efficacy.

4. Conclusion and implication

This study aimed to explore teachers' concerns toward implementing IBL. The results show that not only it is reliable to assess junior high school teachers' concerns toward implementing IBL but also with a satisfied validity to assess and review teachers' concerns toward implementing IBL in a more effective way.

Moreover, in the current study, three distinct teacher clusters were found based on their SoC questionnaire scores. In general, teachers with higher Internet self-efficacy showed their concerns toward implementing IBL on higher stages. Furthermore, this study found teachers who concerned more in the lower stages tended to possess higher basic Internet self-efficacy. However, only those who concerned more in the higher stages showed higher advanced Internet self-efficacy. The results imply that teachers' perceived Internet self-efficacy including basic and advanced ones might influence their concerns toward IBL implementation. It is possible that the advanced Internet self-efficacy was the crucial factor to attain higher levels of concern whereas the basic Internet self-efficacy was essential for teachers to begin to familiarize IBL implementation in their classrooms.

The study was conducted using quantitative measures to reveal teachers' stages of concern toward implementing IBL, which may not be sufficient to provide more in-depth insights for explaining teachers' concerns regarding IBL implementation. Future studies might be needed to employ qualitative or mixed methods to gain a deeper understanding of teachers' concerns toward IBL implementation into their teaching practices. Moreover, the SoCQ used in this study was merely one of the dimensions of CBAM model. To acquire a better understanding of teachers' concerns toward implementing IBL, researchers are encouraged to undertake other dimensions of CBAM model such as Levels of Use (LoU) which describes the behaviors of individuals using the innovation.

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