

Investigation of Key School-related Indicators

Influencing ICT in K-12 Education

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Abstract: In the first phase, Delphi technique was conducted to identify key indicators influencing promotion ICT in K-12 schools settings. The result of the qualitative phase revealed that ICT leadership development, teacher professional development, optimized learning spaces, richness of digital resources, innovative ways of teaching and learning, changes in learning assessment forms six key indicators for ICT in K-12 education. At the second phase of the research, cases from China were selected and scored in each six indicators, and path modeling was built. The findings of this research provide important implications for the evaluation and improvement of the process of ICT reshaping K-12 Education.

Keywords: *ICT in Education; educational change; influencing factors; path model*

1. Introduction

Multiple previous studies have showed that, ICT integration into classroom is a slow and complex process that is influenced by many factors(Levin & Wadmany, 2008). Studies have found that teacher's computer use in years, lack of time, teaching experience, teacher attitude and technology competencies are five elements affecting ICT contribution to K-12 education. Unlike existing research, this research aimed to build a path model at school level for promoting ICT in K-12 education. Consequently, at the first stage of the research, a Delphi technique was conducted to identify school-related indicators for ICT in K-12 education. At the second stage of the research, 40 cases from China were selected to be evaluated by

each identified indicators, and a model for ICT integrating into K-12 schools was built by modeling approach.

2. Methodology

Research questions

- How to profile and analyze the process of ICT infusing in K-12 education?
- What are the key school-related factors influencing ICT integration into K-12 education? And what are the relations between them ?

The first stage of the research: Delphi technique

To select the panelists, the study used two types of non-random sampling, and sampling size was 30 panel members. The Delphi technique in this research included two rounds. In round 1, 30 semi-structured face-to-face interviews with panel members were conducted to explore the key indicators influencing ICT in education in school settings. After interviews, the opinions of the panelists were summarized, selected, and transformed by coding and indexing, and then the obtained data were categorized and compared with the key indicators from literature review. The opinions of the panelists were summarized, and all the indicators from round 1 and literature review were included in the questionnaire of round 2.

In round 2, panelists were asked to determine the degree of importance of indicators based on the five point Likert scale from 1= not important to 5= extremely important to get a consensus on the key indicators that influencing ICT in K-12 school settings. The data of round 1 were analyzed by coding and indexing, and those of round 2 were analyzed using Content Validity Ratio (CVR).

The second stage of the research: case selecting, scoring and analysis

In the second phase of the study, 30 cases (10 primary schools, 10 junior high schools and 10 senior high schools) were selected from pool of the elite schools identified by China Association of Educational Technology and China Education Daily. Then 10 experts in the first research stage were invited to scoring the cases in aspects of the identified key factors. Documents of the selected case were provided to them, and they scored the cases in Likert 5-point scale (1-poor; 2-not

good; 3-on average; 4-good; 5-very good). Then data were collected and analyzed using path analysis to build a path model.

4. Findings

4.1 Research findings from the Delphi technique

Table 1 shows the frequency of panelists mentioning the indicators, also the definition of each indicators were made clear to the experts.

Table 1 Indicators identified by Delphi panel members

N.	Indicators	Frequency			Total (n=30)
		school leaders (n=17)	government officers (n=3)	researchers (n=10)	
1	ICT leadership	15	3	9	27
2	Digital learning resources	10	2	9	21
3	Teacher professional development	11	3	6	20
4	Learning spaces	17	2	7	26
5	Learning assessment	9	2	6	17
6	Pedagogies and learning approaches	12	2	8	22
7	e-learning culture	3	1	3	7
8	Technical support	12	1	6	19

At the second round of Delphi, the degree of the importance for each 8 indicators in table 1 was scored by the panelists. And the CVR was calculated using the following formula:

$$\text{Content Validity Ratio(CVR)} = \frac{n_e - \frac{N}{2}}{\frac{N}{2}}$$

4.2 Research findings from path analysis

4.2.1 Preliminary analysis: data screening, correlations, assumptions

The data of the cases were not missing completely in respect to the six indicators that influence ICT in education.

Examination of the bivariate correlations between variables (see Table3) was

Pearson product-moment correlations between measure of indicators

Indicators	1	2	3	4	5	6	7
(1) ICT leadership	1						
(2) Development of ICT in Education	.271	1					
(3)Teacher professional development	.057	-.010	1				
(4) Pedagogies and learning approaches	.185	.317*	.037	1			
(5) Learning spaces	.110	.208	-.088	.519**	1		
(6)Digital resources	.136	.000	.083	.342*	.379*	1	
(7) Learning assessment	.171	.262	.298	.043	.431**	.157	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

used to inform a prior idea about the nature of the relationships among the variables.

4.2.2 Path modeling

As shown in Figure 1, ICT leadership and teacher professional development are exogenous variables; learning spaces, digital resources, learning assessment, pedagogies and learning approaches and development of ICT in education are endogenous variables in the model. The estimated path coefficients are also presented.

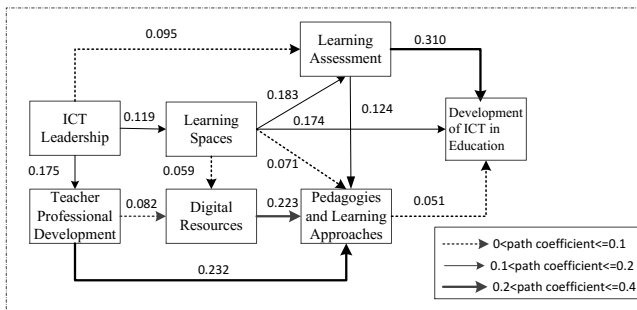


Figure 1 Path analysis results: The estimated path coefficients, *p<.01, two-tailed

5. Conclusion and discussion

This research identified six factors that influence ICT in K-12 education at school level. They are ICT leadership, teacher professional development, digital resources, learning spaces, pedagogies and learning approaches, learning assessment. The process of ICT development in K-12 education highly depends on changes of learning assessment, innovative pedagogies and

learning approaches, and teacher professional development, while changes in pedagogies and learning approaches depends on the optimizing of learning spaces and richness of digital resources.

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