Analysis of Differences in Teachers' Perception on Educational Attributes and Effects of IPTV*

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The purpose of this study was to identify differences in teachers perception on educational attributes and effectiveness of IPTV according to demographic factors. To investigate possibility of educational application, the participants of the study were teachers selected from IPTV initiative schools in elementary and middle levels nationwide. 55 teachers participated from 22 IPTV model schools nationwide, which were 9 elementary schools, 6 middle schools, 7 high schools. As results of research, there were some significant foundings. In terms of the perception on educational attributes of IPTV, there are explicit perceptional difference between "capital area teachers" and "the other regional teachers". However, there were no significant difference according to school level. Perception of male teachers were more positive than those of female teachers. Also, there were no significant difference according to teaching experience. On the other hand, in terms of the perception on educational effects of IPTV, we could conclude that teachers from metropolitan cities have more negative perception on IPTV than teachers from other kinds of cities have. Regardless of school levels, teachers showed merely fair perception on effectiveness of IPTV. There was significant difference between male teachers and female teachers in perception on educational effectiveness. Also, Results showed no significant differences according to teaching experiences. Future tasks for the development of IPTV strategies require specific need analysis of teachers and collaborative works of policy makers, teachers, researchers, and IPTV service providers.

Keywords : IPTV, teachers' perception, educational attributes of IPTV, educational effects of IPTV

Introduction

IPTV(Internet Protocol Television) as digital convergence media brings huge change in broadcasting, communication, and media. IPTV refers to a convergence media of broadcasting and telecommunication using internet protocol (high speed internet), which provides quality multimedia including data, text, graphics, audio and video as interactive broadcasting contents (Leem, Kim, Han, & Koh, 2009). Some features of IPTV such as individualized contents via multi-channel, various interactive service, high quality contents, and familarity, has brought changes in broadcasting, telecommunication, media, and internet business as well as daily life.

Especially, researchers paid attention to educational potentialities of IPTV such as, multi-channel contents, high quality contents, and individualized interactivity (Leem et al, 2009; Paek & Lee, 2009). IPTV is expected to provide individualized and high quality contents, to enhance motivation, teacher-student interaction and student-student interaction in school settings.

Broadcasting and telecommunication committee noticed educational potentialities of IPTV and reported to government 'A policy for reduction of private education cost and removal of education divide through IPTV' (2008. 9). Further, the committee suggested 'A plan for tailored IPTV educational service' (2009. 2) and drove nationwide plan for IPTV educational service from March 2010. Based on this effort, the government has increased school internet speed from 10Mbps to 50Mbps since June 2009 to support technology integration into school. In the meantime, three IPTV service providers prepared for preliminary service by acquiring and developing educational IPTV contents.

Then the Ministry of Education, Science, and Technology (MEST) and Korean Educational Research and Information (KERIS) assigned IPTV initiative schools to explore education use of IPTV and to identify applicability in September 2009. IPTV initiative schools include six KT Qooktv school (35 classes), eight LG myEdutv (35 classes), eight SK Broadband (32 classes) as total of 22 schools and

102 classes. KT provided English and LG and SK provided Social science and Science. The purpose of IPTV initiative schools was to explore the applicability of IPTV in school settings and to identify teachers perception on educational attributes and effectiveness of IPTV.

Prior to practices of IPTV initial schools, the MEST investigated educational applicability of IPTV by assessing teachers' need of educational use of IPTV and developing teaching-learning scenario (Leem et al., 2009). Especially, Leem and his colleague (2009) explored teachers perception on and need of IPTV and suggested considerations and strategies for IPTV integration into school. They conducted survey to 189 teachers from 48 schools and the result revealed that teachers' perception and expectation were high. And teachers expressed intention of using IPTV at regular classes and after school program. Additionally, teachers pointed out relevant to subject and segmented contents were critical for flexible use at classes.

However, the previous research was conducted prior to practical use of IPTV in schools. That is, to identify teachers' on educational attributes and effectiveness of IPTV, it is required for teachers to experience IPTV in teaching and learning process. Thus, the purpose of this study was to identify difference in teachers perception on educational attributes and effectiveness of IPTV according to demographic factors. To investigate possibility of educational application, the participants of the study were teachers from IPTV initiative schools in elementary and middle levels nationwide. The main research questions were as follows:

Are there differences in teachers perception on educational attributes of IPTV according to demographic factors (i.e., the size of the region, school levels, gender, teaching experience)?

Are there differences in teachers perception on educational effectiveness of IPTV according to demographic factors (i.e., the size of the region, school levels, gender, teaching experience)?

Research Method

Participants

55 teachers participated from 22 IPTV model schools nationwide, which were 9 elementary schools, 6 middle schools, 7 high schools. 55 participating teachers answered both pre- and post-test. The participants' characteristics were described in Table Ⅱ-1; by size of cities, 12 teachers (21.8%) from metropolitan cities, 23 teachers (41.8%) from cities under the direct control of the central government, 20 teachers (36.2%) from middle sized cities; by level of schools, 14 (25.5%) from elementary school, 17 teachers (30.9%) from middle school, 24 teachers (44.6%) from high school; by gender, 21 (38.2%) male teachers, 34 (61.8%) female teachers; by teaching experiences, 15 teachers (27.3%) under 5 years, 15

Table Ⅱ-1. Participants statistics

Division		Sample size	%
Size of the city	Metropolitan cities	12	21.8
	Seoul	23	41.8
	Middle sized city	20	36.2
School	Elementary school	14	25.5
	Middle school	17	30.9
	High school	24	44.6
Gender	male	21	38.2
	female	34	61.8
Teaching experience	under 5 years	15	27.3
	5-10 years	15	27.3
	11-20 years	13	23.6
	over 21 years	12	21.8
total		55	100

teachers (27.3%) of 5-10 years, 13 teachers (23.6%) of 11-20 years, 2 teachers (21.8%) over 21 years.

Materials

To analyze the difference in educational characteristics and in the level of awareness of IPTV according to participating teachers' socio-demographical characteristics, independent and dependent variables are decided as follows.

First, in order to measure both educational characteristics and awareness of educational effect of IPTV influencing on the socio-demographical characteristics, the independent variables are selected as teachers' working area, level of school, sex and teaching experience. The dependent variables are teachers' awareness on educational characteristics and educational effect of IPTV. The educational characteristics of IPTV is measured by the items to identify teachers' awareness on the possible strategies and application in education using IPTV. The measuring items were developed based on the suggestion from Lim et al. (2009), Park (2008), International Business Association (2009), and Kennard (2000). The items are including ① lessons using rich learning materials with diverse channels and menus, ② lessons using materials with high definition and high quality audio, ③ easy and friendly interface of TV, ④ easy selection and use of information due to easy operation, ⑤ easy edition and manipulation like adding and changing information according to user's need in class ⑥ diverse two-way interactive lesson ⑦ excellence in learning materials. The dependent variables were questioned on a 5-point Likert scale that ranged from strongly agree (5) to strongly disagree (1). Reliability of the questionnaire is Cronbach Alpha .91. Participating teachers were to asnwer to these items based on their experience using IPTV whether characteristics of IPTV made educational application possible.

Second, The purpose of analysis on awareness of educational effect was to understand teachers' awareness on effectiveness of IPTV in terms of function and

role to achieve educational goal. The achievement awareness questionnaire was developed for this study with modification of achievement awareness testing material used in Lee, et al (2006). To examine the effectiveness and efficiency in management of lesson preparation, operation, wrap-up, and evaluation, this questionnaire includes 25 items; 5 items for lesson preparation, 8 items for lesson management, 12 items for lesson effect. Reliability of the questionnaire is Cronbach Alpha .98.

Procedure

This study to analyze teachers' awareness on IPTV's educational characteristics and effectiveness is as follows. First, research purpose and problem are defined and independent and dependent variables are decided after overall plan for research was established. The background variables regarding participating teachers' socio-demographical variables are identified, and the materials were developed and modified. After development research materials, teachers used IPTV in their classes from October to December, 2009. After implementation of IPTV was finished, the post-test for awareness of educational characteristics and effectiveness of IPTV was performed through online survey system in December, 2009. The data was analyzed through t-test, F-test, ANOVA, etc. The research result was interpreted and discussed for its implication. The process is shown in Table Ⅱ-2.

Analysis

The analysis of data was performed to verify which variables have the practical effect in educational application of IPTV among diverse variables. To examine the difference between two variables, Independent Samples t-Test was used. To verify the relation more than three variables, one-way ANOVA was applied. For post

Table Ⅱ-2. Research procedure

Procedure	Process	Sub activities
Research Plan	Research Plan	- Establishment of research problem & research plan - Search for socio-demographical variables
	⬇	
	Development of research materials	- Search and analysis the existing research materials and testing tools - Development measuring tools for the educational characteristics and effectiveness of IPTV
	⬇	
Field study	Field study on IPTV model school	- Implementation of lessons using IPTV - Analysis educational characteristics of IPTV
	⬇	
Data Collection	Data collection and post test	- Post test for the awareness of educational characteristics and of educational effect - Online data collection
	⬇	
Data Analysis	Data analysis	- independent sample t-test - one way ANOVA, Post hoc test
	⬇	
Result and Discussion	Interpretation of statistical data	- Interpretation of research result based on literature review - Discussion of research results

hoc test of groups which were revealed as statistically significance from ANOVA, Tukey HSD was used.

Research Result

Analysis of differences in teachers perception on educational attributes of IPTV

The result of difference in teachers' perception on educational attributes of IPTV according to the size of region, level of school, gender, and teaching experience as follows.

Differences in perception according to the size of region

<Table Ⅳ-1> shows the result of descriptive statistics of difference in teachers perception on educational attributes of IPTV according to the size of region.

The one-way ANOVA results of difference in teachers' perceptional attributes of IPTV according to region are as follows.

The analysis revealed that "Simple operation and ease of information selection(F=3.25, p=0.04)" and "Ease of editing and treating (F=2.99, p=0.05)" showed significant difference at p<.05 level, while "quality contents(F=5.38, p=0.00)" showed significant difference at p<.01 level. In order to identify meaningful differnce according to the size of region, we performed Tukey HSD. Result revealed that there was significant difference between middle sized city and Seoul in "Simple operation and ease of information selection". Also, there was meaningful difference between metropolitan and middle sized city in "Ease of editing and treating" and in "quality contents". Meanwhile, analysis of effect size(ES*) showed that there were big differences in teachers' perception according to size of region; Effect size of Middle sized city and Seoul in "Simple operation

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* Effect Size(ES): is a measure of the strength of the relationship between two variables in a statistical population, or a sample-based estimate of that quantity. If ES is around 0.2-0.3, it is showing "small effect", around 0.4-0.7 means medium effect, and around 0.8 means large effect.

Table Ⅳ-1. Difference in perception according to the size of region(descriptive)

Items	The size of region	N	Mean	SD
Class using abundant resources via multi-channel, multi menu	Seoul	12	3.17	1.03
	Metropolitan	23	3.61	0.72
	Middle sized city	20	3.55	0.76
	Total	55	3.29	0.81
Course using high quality, hight resolution, and high fidelity materials	Seoul	12	3.42	1.00
	Metropolitan	23	3.74	0.69
	Middle sized city	20	3.75	0.72
	Total	55	3.67	0.77
Familiarity of interface and ease of access	Seoul	12	2.92	1.00
	Metropolitan	23	3.13	0.87
	Middle sized city	20	3.30	0.92
	Total	55	3.15	0.91
Simple operation and ease of information selection	Seoul	12	2.58	0.90
	Metropolitan	23	2.91	0.95
	Middle sized city	20	3.40	0.88
	Total	55	3.02	0.95
Ease of editing and treating	Seoul	12	2.17	0.58
	Metropolitan	23	2.48	0.79
	Middle sized city	20	2.85	0.93
	Total	55	2.55	0.83
Course using through various two-way interaction	Seoul	12	2.33	0.89
	Metropolitan	23	2.74	0.92
	Middle sized city	20	2.65	1.04
	Total	55	2.62	0.95
Quality of contents	Seoul	12	2.33	0.89
	Metropolitan	23	3.09	0.60
	Middle sized city	20	3.25	0.91
	Total	55	2.98	0.85

Table Ⅳ-2. Difference in perception according to the size of region(ANOVA)

Items	Source	SS	DF	MS	F	P	Tukey HSD
Simple operation and ease of information selection	SSB	5.44	2	2.72	3.25	0.04	Metropolitan, Middle sized city > Seoul
	SSW	43.54	52	0.84			
	SST	48.98	54				
Ease of editing and treating	SSB	3.68	2	1.84	2.99	0.05	Metropolitan, Middle sized city > Seoul
	SSW	33.96	52	0.65			
	SST	37.64	54				
Quality contents	SSB	6.74	2	2.87	5.38	0.00	Metropolitan, Middle sized city > Seoul
	SSW	32.24	52	0.53			
	SST	38.98	54				

and ease of information selection" was ES=0.91. Also, each effect size of Metropolitan vs Seoul and Middle sized city vs Seoul was ES=1.18 and ES=0.53. And effect size of Metropolitan vs Seoul and Middle sized city vs Seoul in "quality contents" was ES=1.04 and ES=0.85.

Differences in perception according to school level

<Table Ⅳ-3> shows the result of descriptive statistics of difference in teachers perception on educational attributes of IPTV according to school level.

In order to verify the result of descriptive analysis, we performed the one-way ANOVA, which showed the result in <Table Ⅳ-4>.

The one-way ANOVA revealed that in teachers' perception according to school level was significantly different on in aspect of "Course using high quality, hight resolution, and high fidelity materials(F=3.25, p=0.04)" at p <.05 level. The result of Tukey HSD, which showed size effect ES=0.64, represented that there was meaningful difference between elementary school teachers and high school teachers. That is, high school teachers are more positive than elementary school

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Table Ⅳ-3. Difference in perception according to school level(descriptive)

Items	School level	N	Mean	SD
Class using abundant resources via multi-channel, multi menu	Elementary	14	3.29	1.07
	Middle	17	3.41	0.62
	High	24	3.67	0.76
	Total	55	3.49	0.81
Course using high quality, hight resolution, and high fidelity materials	Elementary	14	3.35	1.01
	Middle	17	3.47	0.62
	High	24	5.00	0.59
	Total	55	3.67	0.77
Familiarity of interface and ease of access	Elementary	14	2.86	1.03
	Middle	17	3.06	0.97
	High	24	3.38	0.77
	Total	55	3.15	0.91
Simple operation and ease of information selection	Elementary	14	2.64	1.15
	Middle	17	3.00	0.71
	High	24	3.25	0.94
	Total	55	3.02	0.95
Ease of editing and treating	Elementary	14	2.36	0.84
	Middle	17	2.47	0.62
	High	24	2.71	0.95
	Total	55	2.55	0.83
Course using through various two-way interaction	Elementary	14	2.43	1.18
	Middle	17	2.41	0.80
	High	24	2.88	0.90
	Total	55	2.62	0.95
Quality contents	Elementary	14	2.71	1.14
	Middle	17	3.00	0.50
	High	24	3.13	0.85
	Total	55	2.98	0.85

Table Ⅳ-4. Difference in perception according to school level(ANOVA)

Items	Source	SS	DF	MS	*F*	P	Tukey HSD
Course using high quality, hight resolution, and high fidelity materials	SSB	5.44	2	2.72	3.25	0.04	High > Elementary
	SSW	43.54	52	0.84			
	SST	48.98	54				

teachers as they think highly of using high quality, hight resolution, and high fidelity materials.

Differences in perception according to gender

To analyze the teachers perception of educational attributes of IPTV according

Table Ⅳ-5. Difference in perception according to gender(t-test)

Items	Gender	N	Mean	SD	t	P
Class using abundant resources via multi-channel, multi menu	M	21	3.86	0.85	2.79	0.00
	F	34	3.26	0.71		
Course using high quality, hight resolution, and high fidelity materials	M	21	4.00	0.71	2.60	0.01
	F	34	3.47	0.75		
Familiarity of interface and ease of access	M	21	3.67	0.73	3.71	0.00
	F	34	2.82	0.87		
Simple operation and ease of information selection	M	21	3.38	0.97	2.31	0.02
	F	34	2.79	0.88		
Ease of editing and treating	M	21	2.90	0.94	2.64	0.01
	F	34	2.32	0.68		
Course using through various two-way interaction	M	21	3.05	1.07	2.79	0.00
	F	34	2.35	0.77		
Quality contents	M	21	3.24	0.94	1.79	0.07
	F	34	2.82	0.76		

Table Ⅳ-6. Difference in perception according to teaching experience(descriptive)

Items	Experience	N	Mean	SD
Class using abundant resources via multi-channel, multi menu	Under 5 years	15	3.60	0.74
	5-10 years	15	3.13	0.74
	11-20 years	13	3.62	0.96
	Over 21 years	12	3.67	0.78
	Total	55	3.49	0.81
Course using high quality, hight resolution, and high fidelity materials	Under 5 years	15	3.93	0.80
	5-10 years	15	3.33	0.72
	11-20 years	13	3.62	0.87
	Over 21 years	12	3.83	0.58
	Total	55	3.67	0.77
Familiarity of interface and ease of access	Under 5 years	15	3.13	0.83
	5-10 years	15	2.87	0.99
	11-20 years	13	3.31	0.95
	Over 21 years	12	3.33	0.89
	Total	55	3.15	0.91
Simple operation and ease of information selection	Under 5 years	15	3.33	1.05
	5-10 years	15	2.67	0.72
	11-20 years	13	3.00	1.00
	Over 21 years	12	3.08	1.00
	Total	55	3.02	0.95
Ease of editing and treating	Under 5 years	15	2.60	0.91
	5-10 years	15	2.07	0.59
	11-20 years	13	2.85	0.90
	Over 21 years	12	2.75	0.75
	Total	55	2.55	0.83
Course using through various two-way interaction	Under 5 years	15	2.73	0.96
	5-10 years	15	2.13	0.83
	11-20 years	13	3.11	1.00
	Over 21 years	12	2.67	0.89
	Total	55	2.62	0.95
Quality contents	Under 5 years	15	3.00	0.76
	5-10 years	15	2.67	0.82
	11-20 years	13	3.31	0.95
	Over 21 years	12	3.00	0.85
	Total	55	2.98	0.85

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to gender, we performed independent samples t-test. Result is as <Table Ⅳ-5>.

Meaningful differences were showed in "class using abundant resources via multi-channel, multi menu(t=2.79, p<.01)", "course using high quality, hight resolution, and high fidelity materials(t=2.60, p<.01)", "familiarity of interface and ease of access(t=3.71, p<.01)", "Simple operation and ease of information selection(t=2.64, p<.01)", and "Course using through various two-way interaction(t=2.79, p<.01)", except for "quality contents". This result can be led the fact that male teachers have more positive view, however the both groups did not show difference in perception on quality contents. Also, effect size was large enough to show meaningful differences in several aspects(i.e., ES=0.83 in "class using abundant resources via multi-channel, multi menu", ES=0.71 in "course using high quality, ES=0.67 in hight resolution, and high fidelity materials", ES=0.97 in "familiarity of interface and ease of access", ES=0.85 in "simple operation and ease of information selection", and ES=0.90 in "course using through various two-way interaction").

Differences in perception according to teaching experience

<Table Ⅳ-6> shows differences in perception according to teaching experience. The result of one-way ANOVA did not showed any significant difference between various groups of teaching experiences.

Analysis of differences in teachers perception on educational effects of IPTV

Analysis of differences in teachers perception on educational effects of IPTV was performed in order to identify teachers' awareness of educational functions and roles of IPTV. The result of difference in teachers' perception on educational effects of IPTV according to the size of region, level of school, gender, and teaching experience as follows.

Differences in perception according to the size of region

<Table Ⅳ-7> shows the result of descriptive statistics of difference in teachers perception on educational effects of IPTV according to the size of region.

The teachers in middle sized city(M=3.16, SD=0.67) and metropolitan (M=3.06, SD =0.61) showed medium level perception on educational achievement. However, teachers in Seoul showed little more negative perception (M=2.48, SD=0.79). To verify the significant difference, we analyzed the data using one-way ANOVA. Result is as follow.

Perception on educational achievement of IPTV according to the size of region was significantly different(i.e., F=4.13, p=0.02) at p<0.5 level. Tukey HSD also revealed specific regional differences: There was meaningful and large difference(i.e., ES=0.86) between middle sized city and seoul.

Table Ⅳ-7. Difference in perception according to the size of region (descriptive)

The size of region	N	Mean	SD
Seoul	12	2.48	0.79
Metropolitan	23	3.06	0.61
Middle sized city	20	3.16	0.67
Total	55	2.97	0.71

Table Ⅳ-8. Difference in perception according to the size of region(ANOVA)

Source	SS	DF	MS	F	P	Tukey HSD
SSB	3.72	2	1.86	4.13	0.02	Metropolitan,
SSW	23.40	52	0.45			Middle sized city > Seoul
SST	27.12	54				

Differences in perception according to school level

<Table Ⅳ-9> shows the result of descriptive statistics of difference in teachers perception on educational effects of IPTV according to school level.

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According to <Table Ⅳ-9>, high school teachers think highly of educational achievements of IPTV(M=3.12, SD=0.45). However, middle school teachers think its educational achievement is below average(M=2.91, SD=0.54). On the other hand, elementary school teachers think less of its educational effect(M=2.71, Sd=1.10). We analyzed the data in order to verify these results by one-way ANOVA. The result showed that there were no meaningful differences. That is, regardless of school level, most teachers think educational effects of IPTV are around average level.

Table Ⅳ-9. Difference in perception according to school level(descriptive)

School level	N	Mean	SD
Elementary	14	2.71	1.10
Middle	17	2.91	0.54
High	24	3.12	0.45
Total	55	2.97	0.71

Difference in perception according to gender

T-test result of analyzing the teachers perception of educational effects of IPTV according to gender is as <Table Ⅳ-10>.

Table Ⅳ-10. Difference in perception according to gender(t-test)

Gender	N	Mean	SD	t	P
M	21	3.30	0.68	2.95	0.00
F	34	2.76	0.65		

According to <Table Ⅳ-10>, male teachers perceive IPTV as more effective educational media(i.e., M=3.30, SD=0.68) than female teachers do(M=2.76, SD=0.65). To find out significant difference, independent sample t-test was performed. As a result, a highly meaningful difference between two gender was

showed(i.e., t=2.95, p=0.00) at p<0.01 level. Also, large effect size verified the result(ES=0.83).

Differences in perception according to teaching experience

<Table Ⅳ-11> shows differences in perception according to teaching experience. result of descriptive statistics of difference in teachers perception on educational attributes of IPTV according to school level.

The results showed that 11-20 year-experienced teachers' perception was the most high(M=3.11, SD=0.80), and 5-10 year-experienced teachers' perception was the most low(M=2.75, SD=0.58). One-way ANOVA did not showed the significant differences. In short, teaching experiences are not significant variable affecting teachers' perception.

Table Ⅶ-11 Difference in perception according to school level(descriptive)

Experience	N	Mean	SD
Under 5 years	15	3.00	0.66
5-10 years	15	2.75	0.58
11-20 years	13	3.11	0.80
Over 21 years	12	3.04	0.82
Total	55	2.97	0.71

Discussion and Implications

In order to answer research questions, this study attempt various analysis to identify difference in teachers perception on educational attributes and effectiveness of IPTV according to demographic factors. Based on the research results, discussion and implications are as follows.

Discussion and implication of educational attributes of IPTV

Teachers' perception according to the size of region

The result of students survey revealed that there were remarkable differences between metropolitan cities and middle sized cities. It represents the fact that there are explicit perceptional difference between "capital area teachers" and "the other regional teachers". So called "capital area teachers" usually have much more opportunities to utilize various educational media than "regional teachers". They also get more training and development programs. Therefore it is natural that these more sophisticated teachers are more negative to IPTV as educational media than naive regional teachers. Mostly the difference results from "difference of educational environment and culture(U.S. Department of Commerce, 1998; Newdy, Stepich, Lehman, Russell, 2006)".

On the one hand, in the "Simple operation and ease of information selection", "Ease of editing and treating", and "Quality contents" area, teachers from metropolitan cities and teachers from middle sized cities showed meaningful difference in their perception. Namely, teachers of middle sized cities think more highly of educational reatures of IPTV than teachers of metropolitan cities. It seems that accessibility to various multimedia and cutting edge material are usually more opened to metropolitan city teachers. Therefore, the teachers who teach at schools in middle sized cities, also have limited opportunities for those media and material, tend to be highly motivated to utilize IPTV actively. The survey results seem to reflect these inclination and tendency.

Teachers' perception according to school level

Research result showed that there were no significant difference according to school level, except in the certain aspect. The result implicates that most teachers recogniton and perception are similar to each other regardless of school level. Educational materials using ICT tools and features are equally disseminated

throughout the various school levels(Song et al., 2005; jung & Kim, 2007), which resulted in somewhat similar responses and perception on IPTV.

However, based on the result of descriptive analysis and one-way ANOVA, elementary school teachers and middle school teachers were more affirmative than high school teachers. It is noteworthy that this result is contrary to previous related researchs. According to the research of Jung and kim(2007) and Kim, et al.,(2002), elementary school teachers showed more positive reponses to ICT based learning than middle/high school teachers. These early research on ICT based learning reflects the "flexible teaching and learning culture" of elementary schools; Most elementary schools are usually more flexible in curriculum than middle/high school teachers. Therefore, cultural factor affected and formed positive attitude of teachers. However, since classroom in theses days ICT materials are very common and usual things in most elementary schools, teachers no more think high quality, hight resolution, and high fidelity of IPTV are critical for educational accomplishment. On the other hand, it seems that middle school teachers and high school teachers found IPTV more dynamic, as ICT tools and materials are still rare in these kinds of school levels.

Teachers' perception according to gender

Perception of male teachers were more positive than those of female teachers. There can be many interpretation for this, but the most possible reason can be a tendency that male group usually takes a more positive view of cutting-edge technology than female group does(Choi & Lee, 2003; Sim & Song, 2008; Swain & Harvey, 2002; Bruner & Bennett, 1997). However, we can not jump to the conclusion that male group has more outstanding ability for accepting new technologies. It is more accurate to say that male group has more generous attitude for new technologies in educational settings, since there was no meaningful difference in perception on quality contents according to gender. That is, male and female teachers both tried to see the quality of IPTV contents from

"educational effectiveness" objectively.

Teachers' perception according to teaching experience

Research result showed that there were no significant difference according to teaching experience. However, the results of descriptive analysis consistently show that teachers of 5-10 years experience tend to show rather negative attitude to IPTV. This is because teachers of 5-10 years experience usually have "critical eyes and expertise" for quality instruction and educational media(Choi & Lee, 2003; Sim & Song, 2008). Teachers with 5-10 years' experience saw IPTV with discerning eye and critical consciousness. Teachers with over 10 years' experience, on the other hand, showed more generous attitude, as they think more highly of educational potentiality of new media.

Discussion and implication of educational effects of IPTV

Teachers' perception according to the size of region

From the research result, we can conclude that teachers from metropolitan cities have more negative perception on IPTV than teachers from other kinds of cities have. It can be also discussed from the fact that there are explicit perceptional difference between "capital area teachers" and "the other regional teachers". "Capital area teachers" were more negative because IPTV was no more attractive educational media than other kinds of various educational media which they have free accessibility. "The other regional teachers", on the other hand, perceived IPTV as unique and attractive media for their classroom activities. We can interpret it that they thought of IPTV as a potential tool for various instructional use, rather than mere substitute for other ICT tools. In conclusion, for "other teachers", IPTV can be powerful media for teaching and learning in their classes.

Teachers' perception according to school level

Regardless of school levels, teachers showed merely fair perception on effectiveness of IPTV. Based on this result, we can think educational potentiality of IPTV is quite high and have a bright prospect. It is because merely fair perception can be changed more easily than negative perception. Eventually, wide diffusion of IPTV will be under the influence of service providers and leaders' receptive capacity and decision. If they can develop quality contents based on need analysis of teachers, the future of IPTV as educational media will be more hopeful.

Teachers' perception according to gender

There was significant difference between male teachers and female teachers in perception on educational effectiveness. It can be reasoned from the fact that male teachers are more used to and more familiar to educational media than female teachers are. Female teachers tend to focus on inconveniency of utilizing IPTV devices and unfriendly interfaces rather than to see its educational effectiveness itself.

This should not be jumped into dichotomous way of thinking gender difference. Rather, we should interpret the difference in terms of educational context. Using new technology can be normal task for instruction to male teachers, whereas it can be challenging task for female teachers. Therefore, we should accept the fact that there are meaningful differences between two groups and accommodate appropriate instructional strategies in order to diffuse IPTV based on the gender differences.

Teachers' perception according to teaching experience

Results showed no significant differences according to teaching experiences. But teachers with 5-10 years' experience showed consistent negative reponses. This group of teachers are in the stage of forming their own opinions and eyes for

instruction. They strive for introducing effective educational media for their classes. Therefore, the negative attitudes of these teachers implies the side effects or low possibility of educational effectiveness of IPTV. In order to make IPTV more effective and more powerful media, thorough need analysis of teachers with approximately 10 years should be performed prior to IPTV services in nationwide scale.

Based on the discussion of research results, we can draw our conclusions as follows.

First, the differences of perception result from cultural context and educational environments rather than the differences of quality of teachers(U.S. Department of Commerce, 1998; Newdy, Stepich, Lehman, Russell, 2006). Teachers from metropolitan cities, where instructional infrastructures are well established, were not quite attracted to new media; Teachers from middle sized cities were highly motivated by new media. Therefore, to the teachers of middle and small sized cities, IPTV can be attractive and effective media for their instructional use in classrooms.

Second, most teachers considered IPTV has meaningful potenciality in educational effectiveness, however middle school teachers and high school teachers were more positive than elemetary school teachers. Strategies for utilizing IPTV as instructional media should be specified based on the difference of school levels.

Third, the result that gender difference affect the difference of perception on IPTV implies we should take different approach based on gender difference. We should note that this will be critical to diffusion of IPTV, since these days female teachers have numerical superiority to male teachers in K-12 school settings.

Fourth, teaching experience is another critical factor to consider in order to introduce IPTV in everyday life of teachers in school settings. Especially, focused-promotion and advertisement of IPTV to teachers of 5-10 experiences who tend to have their own firm opinions and views on instructional technologies.

In order to maximize the effectiveness of IPTV, it is necessary to reflect public

opinion and needs of teachers based on practical research. We need to overcome the paradigm of seeking for "another substitute for outdated media". Rather, we should seek for the possiblity of IPTV as media for improving instructional strategies and activities actively. In order to facilitate this efforts, teachers from fields, related researchers, IPTV service providers, and policy makers should collaboratively work together to elaborate instructional strategies for IPTV.

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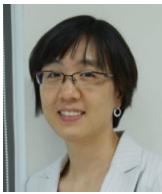E-mail: jhleem@incheon.ac.kr

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