

Educational Use of IPTV: Issues and Future Directions

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National support for use of IPTV in school has increased for the purpose of enhancing public education. As a convergence media, IPTV is expected to create a better and more successful learning experience with individualized content and advanced technology. While the potential benefits of IPTV have been discussed in different perspectives, we cannot fully benefit from new media without careful preparation and pedagogical consideration. Therefore, purpose of this study was to investigate educational use and applicability of IPTV in Korea. First, it redefines the concept and characteristics of IPTV in an educational context. Second, it identifies the main issues and considerations in practice. Lastly, the paper discusses guidelines for future tasks to facilitate the educational use of IPTV in terms of educational application, technological issues (e.g., LMS, set-top box), and content development.

Keywords : IPTV, Internet Protocol Television

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Introduction

With the exponential growth of information communication technology, digital convergence of devices, network, and service has brought a huge change in the media and information communication environment. Convergence originally refers to an approach or cross to make consensus or connections from different points. In that sense, digital convergence is a way to develop a new product or service by integrating various information technology products and services. In Korea, there has been a more accelerated introduction and use of IPTV in school through with governmental support. It is expected that almost all classrooms will be equipped with IPTV in the near future.

IPTV(Internet Protocol Television) is one of the most popular digital convergence media - providing quality multimedia such as data, text, graphics, audio, and video as an interactive broadcasting content via internet protocol (i.e., high speed internet). It is a system where a digital TV service is delivered via Internet Protocol over a network. Generally, IPTV is understood as TV contents received by the users through the computer networks instead of traditional broadcast. TV is easy to use and most users are already familiar with utilizing a remote control. Therefore, it is natural that IPTV can be widely used worldwide.

Some features of IPTV (e.g., multi-channel contents, high definition, and interactivity) have great potential to the field of education. Multi-channel contents can respond to the different needs, preferences, and styles that an individual learner has. High definition content provides a more vivid learning experience; consequently learners can be more engaged in the learning process. Interactivity is one of the greatest benefits IPTV has provided. Users (teachers and students) can interact with the contents and technological features as well as with one another. If IPTV provides individualized and high quality content to motivate learners, it could improve the quality of public education. It is also expected to provide a more user centered educational service by enhancing two- way interaction between teacher-

learner and learner-learner.

While IPTV users have increased recently, it is not so clear how it can be used in the field of education. It is still new in schools, so little is known regarding to how teachers and students might use it for their classes, what kinds of content is available, and how teacher- learner interaction can be enhanced. It is critical to identify what teachers and learners need to use IPTV. Another consideration is the technological issues. Since the teachers need time to get used to using computers and the internet, they are not at present, fully prepared for new devices such as set top box. What functions and characteristic of the LMS(Learning Management System) for IPTV should have beforehand need to be considered.

The purpose of this explorative research is to investigate educational use and application of IPTV. It begins with exploring the concept and characteristics of IPTV in educational context. Then main issues and considerations for educational use of IPTV follow. Next, the future tasks to facilitate use of IPTV are discussed in terms of educational application, technological consideration, and content development.

The Concept and Characteristics of IPTV in Educational Context

The concept and characteristics of IPTV

Basically, IPTV(internet protocol television) refers to a convergence media of broadcasting and telecommunication. There are also a variety of definitions of IPTV based on the different attributes of the media involved.

“IPTV refers to a comprehensive internet protocol networked media service including VOD(video on demand), HD(high definition) real time

broadcasting, streaming video high quality provided by TV” (Academic Society of International e-business, 2009)

“IPTV refers an internet based media service including information service, video, and broadcasting contents through high speed internet and TV while maintaining user experience of “watching TV at convenience” (Shin, 2008)

“IPTV Internet Protocol Television (IPTV) is a system through which digital television service is delivered using the architecture and networking methods of the Internet Protocol Suite over a packet-switched network infrastructure, e.g., the Internet and broadband Internet access networks, instead of being delivered through traditional radio frequency broadcast and cable television (CATV) formats.” (Wikipedia, 2009)

“IPTV refers to an additional service transmitting video, audio, text, data via internet protocol. It provides a certain quality of linear/non-linear programmed channel that can be considered as one channel.” (OECD, 2007)

“IPTV refers to a multimedia service transmitting television, video, audio, text, graphic, and data through IP based network to manage a certain level of service quality, security, interactivity, and reliability.” (ITU-T, 2006)

The common features of IPTV based on the definitions above can be categorized as 1) it uses internet protocols or high speed internet, 2) it provides a variety of digital broadcasting content, especially video clips, 3) it is as easy to use and familiar to users as TV, and 4) the service quality is guaranteed. The core attributes of IPTV are well represented in the address by Kennard, a former

president of FCC (Federal Communication Commission) at the Consumer Electronic Show in January 2000 in Las Vegas. He advocated that IPTV can be understood in three different ways.

First, IPTV is considered to be an 'Internet Protocol TV'. IPTV service is transmitted via internet protocol network; thus it is possible to provide all the services provided by traditional internet TV as well as a high definition broadcasting service. Second, IPTV is regarded as an 'Interactive Personal TV'. That is, IPTV can support interactive activities, two-way services and personalized service. For example, users may send opinions during real time broadcasting, participate in two-way video conferencing or chat, and can be involved in electronic commerce with a remote control, keyboard, as well as other kinds of input devices.

Third, IPTV is understood as Intelligent Program TV. IPTV can provide intelligent service responding to a user preference, style, and taste. In other words, it identifies the right contents according to individual needs and desires while at the same time, it manages and traces personal learning history and progress using systematic analysis to meet those individual needs. In short, the following are three core attributes of IPTV: the use of internet protocols, supportive interaction and the provision of personalized content and intelligent program.

In conclusion, IPTV may be defined as, "it is 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."

Educational attributes of IPTV

While IPTV is widely used commercially, little has been discussed on its educational utility. However, IPTV promises many possibilities as an educational tool. Some benefits can be described as follows.

Multi-channel, segmented broadcasting content

Multi-channel and diverse contents provided by IPTV can be a meaningful source for education. No educational media can fully support individual learning style and learning condition with personalized content via multi-channel. Traditional TV only provided a limited number of channels and computer-based content couldn't guarantee media file size, screen size or resolution. However, IPTV can expand the number of channels used for educational purposes and provide diverse and segmented content for learners with different needs.

High resolution, high definition, high fidelity content

IPTV can provide HD (High Definition) as well as SD (Standard Definition) content. Learning contents should be equipped with high resolution, high definition, and high fidelity to enhance learning outcomes. One of the benefits of multimedia is its vividness because this promotes learners' motivation. Therefore, IPTV learning content with vivid materials will not only engage learners in the learning process but will also help learners better understand the content.

Interactivity, two-way service

One of the core attributes of IPTV is its supports for two-way service. Traditional TV has been considered as one-way media, IPTV, on the other hand, provides different types of interaction and communication via internet protocol. Since interaction is one of the most critical factors in education, the interactivity of IPTV can be more beneficial to both the teaching and learning process.

One example of two-way IPTV service is Closed User Group (CUG). CUG refers to a group of people who form a closed community for the purpose of sharing information and materials while managing certain channels. IPTV makes it possible to build different types of group such as learning communities for certain subjects, communities among classmates, and informal learning groups among teachers and/or students in different regions. IPTV also supports synchronous

interaction (e.g., instant messaging) or immediate question and answer sessions between teachers and students during real time online lectures. In addition, the videoconferencing system supports diverse interaction and learning activities when web cameras are available.

Adaptive and individualized educational service

One of the most outstanding features of IPTV is an individualized educational service for the different needs and abilities of learners. There has been a lot of effort to provide adaptive, individualized, and tailored instruction in the field of education. When the computer was first employed for educational purpose, many people expected to have opportunities for individualized instruction. Furthermore, we believed that we could access to personalized materials through the internet. IPTV can further the opportunity for access to adaptive and individualized educational content. Multi-channel IPTV provides different types of content to meet individual needs and recommends a customized contents data base (i.e., history of use, user preference).

The vision of IPTV 2.0

Although the introduction and use of IPTV in Korea doesn't have a long history, IPTV will make progress due to a rapid growth of technology. Hong (2009) suggests the concept of IPTV will change according to recent developments in technology. That is, the current IPTV is version 1.0 because it is based on the wire system. However, IPTV 2.0 will be based on the wireless system and provide adaptive media content on the web. Three the main features of IPTV 2.0 can be categorized as intelligent, real, and mobile program.

First, intelligent program means that personalized IPTV programs respond to users' preferences and taste. In an educational context, as adaptive and tailored educational services become more intelligent, IPTV traces learner's learning history and provides the right content and service for individual needs.

Second, real program refers to the actual feelings and experience provided by 3D (3-Dimensional) and UHD (Ultimate High Definition) media. 3D and augmented reality contents are more engaging, consequently, they can enhance learning outcomes.

Third, mobile program refers to portable IPTV which is both time and place independent in a wireless environment. Learning content is accessible through mobile phones, PDA's, laptop's, and PMP's. Learners can be involved in learning activities anytime and anywhere. They are not available in educational settings at this point, however, future educational use of IPTV should aim to include them.

Main Issues and Considerations in the Educational Use of IPTV

There are several issues to consider when using IPTV as educational media. Those issues mainly concern instructional strategies for teaching and learning activities, technical problems, and IPTV content. Considerations and issues from the discussion below can be categorized into three aspects: 1) considerations for the educational application of IPTV, 2) technical issues in the educational use of IPTV, 3) considerations for IPTV content development.

Considerations for educational application of IPTV

Educational application of IPTV in various areas

First of all, the possibilities of IPTV should be explored in a great variety of educational areas, such as IPTV for typical classroom courses, after-school study activities, special education for the gifted, education for the handicapped, college preparatory lectures in high schools, optional subject studies in middle schools, and career and learning counseling. Also the possibility of educational media for very special educational purpose should be explored thoroughly. For instance, IPTV can

be used as educational media for parents of students, teacher training programs, public service education and special ability developing programs. Not only in K-12 schools but also in colleges, graduate schools, and lifelong education institutes, IPTV has the potential energy to be a powerful educational tool. However, its potentiality for actual use should be surveyed and analyzed carefully in advance.

Various ways of using IPTV in educational context

Next, we will focus on “various ways” of using IPTV as well as focusing on various areas of education. The typical way of using IPTV in classrooms is to provide with IPTV materials for delivering course content. However, we should assume IPTV can be used elsewhere in more flexible ways; students may use IPTV in school libraries and in special classrooms for English education in schools. They can also use IPTV in regional study rooms, for the purpose of developing CUGs by regional offices of education, for communication in CUGs between students and school committee members, in international video teleconferencing, in nationwide video teleconferencing, and in blended learning to connect schoolwork and homework. Through these various ways of using IPTV we can maximize its educational potentiality. Likewise, IPTV can be used with various cooperative instructional methods such as project-based learning and collaborative learning. Generally IPTV is known as an individual learning media and not as a collaborative learning tool in an educational context, as it is typically used in the way of “personal TV watching”. But team projects and collaborative work are possible if IPTV content is accompanied by elaborated instructional strategies and course management skills.

Integrating IPTV contents with web contents and online resources

We should also actively integrate IPTV contents with abundant educational resources scattered among web sites and in online learning systems. Since many teachers in classrooms have already been using existing ICT materials for a long

time, it is very likely that they would prefer to use their “old” ICT materials rather than to use “new” IPTV if the quality of the content and its usability do not fulfill their needs. If using IPTV causes teachers’ and learners’ inconvenience or results in providing low level content, most teachers will not use IPTV as a media for their everyday classroom work. Therefore, if IPTV content and services are no better than existing ICT materials and tools, policy makers should not ban the use of ICT materials for teachers. Using ICT materials can also facilitate using IPTV in case where teachers cannot find their instructional resources from existing ICT materials in time. However, set-top boxes generally in common use can’t provide an integrated service between IPTV and existing ICT materials at present; we have to find proper solutions for this issue sooner or later. Using set-top boxes for PC or Set-top boxes for USB can be reasonable resolutions as a whole. In any case teachers’ rights of selection and discretion should be valued in using IPTV as an educational tool so that its use can be adapted to each teacher’s and student’s needs.

Developing instructional models and strategies for IPTV use

Finally, developing instructional models and teaching-learning strategies for IPTV is required in order to fulfill its educational purpose. Since most teachers in the field have little experiences in using IPTV in their classrooms activities, providing IPTV facilities without proper instructional guides may raise quite confusion among them. To offset some of this confusion, a variety of instructional methodologies, models, and tips should be provided as well as quality content. IPTV is based on VOD or Video streaming service and typically assumed classroom activities, so its technical operation is mainly to be performed by teachers. Thus, it tends to be media for teacher-centered lectures or other teacher-centered instructions. However, IPTV has a lot of strengths and attributes such as utilizing multiple elaborated channels, interactivity, high definition screen, and support s for individualized adaptive learning. Therefore we have to seek for strategies which can maximize these strengths as well as a diversity of instructional models which enable

the supplement of teacher-centered instructional models.

Technical issues in educational use of IPTV

Set-top box

Set-top box is an important device essential to accomplish high performance and quality service. Set-top box for educational purposes should be equipped with a great variety of input and interactive units which enable high service quality and user friendliness.

First of all, set-top box is critical as it determines the performance of IPTV and its quality of service. IPTV set-top box for educational use should be equipped with equip various effective input units, interactive units, to say nothing of an effective operating interface for high usability. Currently there are three types of set-top boxes: set-top boxes for home videos, set-top boxes for PC's, and set-top boxes for USB's. Each type has strengths and weaknesses in different situations, so considerations for different use in varied situations are critical for effective teaching and learning.

Set-top boxes for home videos are much cheaper than other types of set-top boxes but have a low performance level. Set-top boxes for PC's can fully utilize every function of a PC, so PC-based high performance is its strength and advantage. But set-top boxes for PC's are relatively expensive and not quite as convenient as portable devices. Set-top boxes for USB's are cheap and portable but unstable due to some technical aspects. The weaknesses and strengths of each type should be analyzed carefully in order to select the most reasonable type for various educational situations, especially in our typical school settings and surroundings.

LMS(Learning Management System) for IPTV systems

LMS's for IPTV are systems managing overall teaching and learning processes based on IPTV, T-learning. Contrary to general e-learning services using PC's,

which use a lot of text messages for instructional purposes, IPTV tends to focus on providing vivid video materials. Therefore, regardless of the size of the screen, IPTV has limits in holding and in providing a large number of text messages and menus. This is the main reason for developing the LMS's with brief key learning messages. Functions and tools for teachers to design, to prepare, to perform, to manage, and to evaluate courses should be the main parts of LMS's.

If IPTV is to be media for a variety of learning activities and not only be mere "TV contents provider", LMS's with course and content management functions, such as content planning, accumulating, structuring and listing, and evaluation tools need to be equipped properly. As well as essential course management tools, community managing tools like discussion forums, learning blogs, and wiki systems are critical functions needed to share and to create group knowledge.

Educational functions for utilizing IPTV in classroom

We should make every effort to troubleshoot problems found in IPTV utilization. To use IPTV effectively in classroom activities, we need not only basic input devices such as remote controls and set-top boxes but also other devices like computer keyboards, computer mouses, keypads, and touch screens. Also in order to supplement the possible weakness of interactivity, we should actively seek new technologies which can make up for the weak points in input and output functions. We also have to look for resolutions to problems on content revision and reuse. Likewise, problems in operating and on managing IPTV devices during course work – such as presenting enlarged/minimized screen content, multi-windowing, screen capturing and saving, bookmarking scenes in videos, and categorizing subject matters – is critical issue. These kinds of problems can be dealt with enhancement of set-top box performance or functions in LMS. We have to make careful decisions about whether to use set-top box or to use LMS, since the decision once made will affect an input of enormous expense for either one.

Production of high-definition, high-resolution TV programs

High end technologies for producing and streaming educational videos of high definition need to be developed. Currently teachers who have some experience with IPTV, think IPTVs in classrooms do not have high enough definition to fulfill the purpose of providing vivid real life experience. The development of related technology is indispensable for content to enhance learners' experience of the "learning flow". High definition of 3D graphics and videos can be the elements of the content that require vivid simulation, e.g., geometrical figures in mathematics and material for experiments in science.

In addition to providing an authentic vivid learning experience, high-definition and resolution TV programs can mitigate the visual and audio inconveniences of certain physical conditions. For example, subtitles in IPTV are quite blurry and so small that students on the far side of the classrooms can't read nor recognize them. Also, "visually-challenged" students can benefit from the high definition IPTV, as it can provide clearer and brighter images.

Development of intelligent, lifelike, and mobile IPTV (IPTV 2.0)

As IPTV 2.0 move towards intelligent TV, lifelike TV, and portable TV, core technologies which can enable taking shape of these concepts into real functions should be developed. To become intelligent TV, tracing systems for learning history should be established in order to develop and to provide learning content and resources for individual needs. Also, to provide lifelike IPTV content, the technologies of 3D content, augmented reality content, and virtual reality content should be integrated into instructional activities. Portable TV should be equipped with mobile IPTV systems and functions so that integration of in-class activities and out of class activities are possible anywhere. In this case prototype development, simulation systems, and model courses will be indispensable prerequisites.

Considerations for IPTV content development

Types of IPTV content

One of the major issues in IPTV content development is what kind of content should be developed as learning materials adapted to the unique attributes of IPTV. Leem and his colleagues(2009) found that the needs of the educational use of IPTV were quite strong among teachers in the field, and they preferred 1-5 minute-length video clips which can support classroom lectures closely related to their course subject matter. Therefore, IPTV content should be provided with these conditions. That is, IPTV content should take the form of short segmented video clips that correspond with classroom work flow – which has an introduction, a main body, a summary – and with quality contents and high usability.

Developing and providing a guidebook and instructional tips for IPTV use

If we are to use existing educational ICT materials for IPTV, guidelines that provide detailed commentary on the major features of the content and casebooks for instructional tips are prerequisites for the sake of users. Teachers can save the time spent in searching for various materials by using these resources. They do not have to waste their effort to find menus, icons, and textbook-related content.

These guidebooks and tips are, especially, useful to teachers who are not accustomed to new media or who are even showing the symptoms of technophobia. Novices can follow step-by-step directions and get away from emotional burden of using “cutting edge technologies”, not to speak of learning useful tips for teaching and learning activities. Also users who tend to be early adaptors and good at new technologies can be prevented from getting one-sided, that is to lean to the technical side too much. The instructional guideline will lead them to see the educational features of IPTV and get them to use it as educational tool.

Classifying and categorizing IPTV content

Categorizing IPTV content and providing systematically ordered program lists are necessary in order to guide users to pick and utilize the correct content at the right time. Note that in many cases, users get confused and frustrated in the absence of properly ordered program lists, even if they can get abundant content in a timely manner. IPTV content categorization is meaningful and important especially for novice users.

Categorizing content should be not only a product of classifying subject matters but also a product of educational themes and goals. For instance, teachers should be able to find content using various criteria such as instructional learning objectives, grades, chapters, and lessons in order to meet their instructional needs. Short guides or summaries for the contents can be also useful for teachers who want to preview the main points before using detailed subject matters.

Prohibiting TV commercials while downloading

TV commercials should be prohibited during educational use of IPTV. TV commercials may make students become inattentive and distracted, and what is worse is that educational IPTV might become an arena of commercial competition. Therefore, all commercial messages should be prohibited while downloading and watching IPTV content. Instead, guides for educational program composition or tips for finding useful materials must be provided continuously. Through these guides, it is possible to enhance teacher training by repetitive watching, to say nothing of saving formal training program expenses.

Developing content integrated into everyday life combined with learning experience

Fifth, we have to focus on developing content which can be integrated into everyday life with formal learning experiences. “Learning while watching TV” is more desirable rather than “learning by watching TV”. That is, we should not

design IPTV contents as learning resources for classroom lectures but as resources for making mere daily life activities like watching TV into meaningful learning experiences. Through these kinds of content, students can learn to develop diverse perspectives dealing with a phenomenon in the real world, and to enhance emotional and cognitive growth through programs on current social events and issues (global warming, drug abuse, etc.). In order to meet the goals, an interdisciplinary effort to link knowledge and technologies of the education and mass communication areas are indispensable.

Conclusions: Future Directions to Facilitate Educational Use of IPTV

Effective distribution and diffusion of IPTV in schools is mainly up to policy makers: Policy makers' decisions can affect the overall directions and guidelines of IPTV services, and those directions and guidelines can affect technical/systemic supports and ways of using IPTV in the field as well as content development strategies. Policies that can be critical for facilitating use of IPTV are as follows.

First, policy makers must play a key role in providing technical support and the basic infrastructure for IPTV. As a matter of fact, to meet these goals, the Broadcasting Commission and Ministry of Education, Science and Technology are in the process of cooperating to upgrade 10 Mbps internet networks into 50Mbps internet networks within the year of 2009 so that users in 240,000 classrooms in schools nationwide can use IPTV effectively. In addition to enhancing internet networks, more specific decisions are needed, i.e., whether to introduce new computers, to confirm the types and details of set-top boxes, to introduce electronic boards, and to introduce new remote controls and keypads. Even if these seem to be merely technical elements of IPTV, they can play a critical role in deciding teaching and learning strategies and the tips provided.

Second, instructional models for teaching and learning for IPTV should be developed to remain and become even more effective over time. Currently, policy makers have set up basic policies that “every school will have IPTV facilities installed”, but no further than that. This means, policies need to be specified enough to decide the central operating body for content development, distribution, and quality control. Establishing and organizing an “IPTV support center” can also be a critical issue for policy makers. Moreover, there are plenty of decisions to make about service the use to be made of the three major IPTV service providers – LG dacom, KT, Hanaro - in Korea. For instance, policy makers can evoke market competition between these three providers by granting greater autonomy to every school to choose its own service company, or they can establish integrated service providing systems by forcing collaborative work among the three providers. Still, there are several issues and problems to solve through careful decision making, e.g., setting up technical standards for sharing contents and service systems. However, there are no specific policies nor rules for these critical issues on using IPTV. What is more, members of some major educational organizations and institutes are taking a poor view of introducing IPTV into actual classrooms. If making clear policies are delayed and nobody takes the lead, establishing definite strategies and tasks for IPTV use will be also put off and IPTV technologies and content will lack consistency in its development process, which can lead to the great waste of financial resources. Therefore, clear policies and tasks for IPTV introductions must be developed and performed with a clear order of priority.

Third, it is necessary for policy makers to develop guidelines for IPTV content to define the conditions of content as educational resources for teachers and learners in the field. Currently, it seems that the Broadcasting Commission and the Ministry of Education, Science and Technology are considering three major IPTV service providers and content providers as the main bodies for content development. Undoubtedly, IPTV service providers should play a great role in developing and in distributing IPTV contents. However, “educational” content certainly needs to

contain more educational features, because IPTV content for general use can be treated as normal TV programs but educational content will be used as actual teaching and learning materials in schools and in homes. Thus, their learning objectives should be clearly defined and the educational knowledge should be designed carefully based on instructional criteria. Therefore, policy makers should develop criteria and standards for educational content and distribute those to service and content providers in order to manage the quality of the content. Further, since educational IPTV content has low profitability and a relatively harsh development process, private enterprises cannot always guarantee qualified content. It thus appears that nationwide regional Offices of Education and public broadcasting organizations such as EBS educational broadcasting and Edunet should participate actively in developing educational IPTV content. In addition, financial support for the Broadcasting Commission or the Ministry of Education, Science and Technology will be a critical factor in facilitating the development of quality content.

Fourth, before installing IPTV facilities directly into the fields, prototypes of content and services should be verified through trial and error in running model schools. The result of the survey showed that teachers have negative opinions due to the overall lack of IPTV content and the inconvenience of managing IPTV devices and content. Also, they think the contents closely related to their subject matters are insufficient and interactivity functions are insufficient as well to fulfill their requirement for educational communications. In this situation, teachers in the field will oppose the plan of using IPTV as their instructional media with the spread of negative perception of IPTV. Hence, though taking the risk of losing time, we should phase IPTV into the field gradually, keeping step with installing infrastructures, with developing quality content, and with developing desirable technologies/devices adaptable to IPTV features.

Finally, policy makers should establish support systems for teachers. IPTV still has low name value among teachers, so distributing pamphlets and publications

might be necessary, e.g., distributing PR brochures about digital convergence in the broadcasting and telecommunications areas, as well as about definitions and the potentiality of IPTV as an educational media. Also teachers who are already using IPTV services in their home can be provided with free educational content within a given period, facilitating their recognition of the educational capability of IPTV. The pilot schools should be equipped with abundant casebooks, resources, and guidelines about how to use IPTV to reach their educational goals.

In an era of new technology introduction, there has always been a problem of “over sold and under used” due to excessive unnecessary products and more importantly a lack of coherent, concise and clear strategies. IPTV has great potentiality as an innovative educational tool, but it also requires copious financial support and effort. In order to allow IPTV to take its place as users’ favorable and useful media, policy makers should take enough time to verify every element, technology, and device of IPTV rather than impatiently and suddenly introducing IPTV without proper preparation and research.

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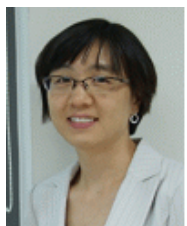
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