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A Conceptual Study for Utilizing IPTV as an Aid for Co-Creation of Value in Future Education

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[Abstract]

Nowadays, a lot of educational TV programs have focused on the program providers' perspective, namely through goods-dominant (G-D) logic. However, the growing development of current technologies such as IPTV with AR and VR has opened opportunities to go beyond a provider-centered perspective and to add the co-creation of value, since value can be created through the interaction between learners and the TV programs themselves. With this in mind, learner-centered TV programs, which are based on service-dominant (S-D) logic, should be offered through educational TV channels. This conceptual paper summarizes, analyzes, and synthesizes the present status of IPTV in education and suggests a new instructional approach for utilizing TV in future education based on value co-creation through learner participation. Three principles (service-dominant logic as an educational service design principle, goal-based scenario for instructional design, IPTV as state-of-the-art technology innovation) are suggested for designing educational IPTV programs.

▸ **Key words**: Educational Television, IPTV, Co-Creation of Value, Service-Dominant Logic, Goal-based Scenario

[요 약]

최근에는 증강현실, 가상현실을 활용한 IPTV 등 TV 관련 기술이 빠르게 발전하고 있다. 이러한 새로운 기술은 공급자 중심의 관점을 넘어설 수 있는 좋은 기회를 제공해 준다. 지금까지 많은 교육용 TV 프로그램은 프로그램 제공자의 관점, 즉 제품중심 논리에 중점을 두었기 때문에, 내용 전달 수준을 넘지 못하였다. 따라서 학습자와 TV 프로그램이 협력하여 새로운 가치를 창출하기 위해 프로그램 제공자의 관점을 넘어 가치공동창출이라는 새로운 관점이 요구된다. 이 논문은 가치의 공동창출을 위한 교육용 IPTV 프로그램 설계 세 가지 원칙(교육서비스디자인 원리로서의 서비스중심논리, 교수설계로서의 목적기반시나리오, 기술혁신으로서의 첨단 기술 접목 IPTV)을 제시하였다. 이는 세계적인 감염병으로 인해 비대면 교육을 위해 IPTV를 교육서비스관점에서 설계할 수 있는 새로운 안목을 제공해 줄 수 있을 것이다.

▸ **주제어**: 교육용 텔레비전, IPTV, 가치공동창출, 서비스중심논리, 목적기반시나리오

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I. Introduction

21st century's rapid evolution in the field of Information and Communications Technology (ICT) has brought rapid changes to instructional demands and methods in the educational service sector. Efforts to utilize evolving TV technologies have been made over the years, and TV evolved from being black and white (monochrome), then into color TV, followed by the incorporation of 3D (three-dimensional) technologies, and finally the development of IPTV (Internet protocol television), which affords online interaction. IPTV can be defined as an Operating System (OS) platform-based TV which, in addition to traditional broadcasts, provides access to online video clips and applications such as social network services, email, and location-based services.

Google and Apple have tried to get user interest in the smart TV market but failed to achieve it. Research revealed that 99.6 percent of usage of smart TVs were solely for watching traditional TV programs [1]. That is to say, consumers mainly use smart TVs as traditional televisions. In fact, people who watch TV do not seem to want to actively interact with it or find information but instead, prefer to rest comfortably while they watch their TV shows. In view of this, educational TV shows have been developed from the perspective of television content providers, which is not ideal. To cope with this educational issue, a new approach is required: Instead of solely delivering instructional contents, the purpose of educational television should be changed into the co-creation of value, with value being created collaboratively through interactions between learners and the content broadcast on TV. This co-creation of value would shift the paradigm of provider-centered educational TV into one that is learner-centered, since educational content provided through the TV does not only include goods but also service. This article suggests three principles for designing and developing educational IPTV programs; Service-dominant (S-D) logic as an educational service design principle, GBS (goal-based scenario) for instructional design, and IPTV as state-of-the-art technology innovation.

II. Literature Review

1. Analysis of Present Educational IPTV Programs

The characteristics and technology currently utilized to distribute educational content through IPTV in South Korea are as follows:

1.1 TV SSOK 2.0 (KT Corp)

TV SSOK 2.0 uses hyper-broadcasting technology based on augmented reality. This technology is normally used by weather forecasters in TV news programs to interact with graphics and images with weather information as if they existed in front of them, while in reality, they are just interacting with a chroma-key green screen. Using such technology, TV SSOK 2.0 exposes users to a different learning environment in which they can actively interact with virtually animated characters, making them feel as if they were part of the story (Figure 1). To achieve this, the live background subtraction, live overlay, and live chroma-key are implemented.

TV SSOK 2.0 has already expanded their educational content to various areas such as language, math, science, and arts. For example, in the content for science education using a game format, learners can participate directly in games led by a popular animation character. In a task of learning about a dinosaur, first of all, a character poses a simple question (i.e., name, type of dinosaur) and then, learners can talk directly to the character on the screen to solve a given problem through two-way collaborative interaction or to ask for any other type of support. The character also provides realistic graphics using Augmented Reality with information about specific dinosaur characteristics (location, a period of activity, and a type of food). In addition to the

character's direct support, Artificial Intelligence generates specific sound effects (e.g., roaring sounds of a T-Rex) and background sounds (e.g., loud, heavy music for carnivorous dinosaurs and mild music for herbivorous dinosaurs) related to the information being asked in order to help learners solve the given problem. Moreover, this system can create a database of users' detailed content history to recommend information and content they might need or be interested in. In other words, TV SSOK 2.0 can provide customized content and support optimized for an individual learner interested in a particular subject and educational content. This is possible due to the system's ability to analyze a database of channels or content used most often by other users with similar interests and learning experiences.

In addition, this service also introduces a variety of functions that can be very appealing to parents of preschoolers. Using their smartphone, users can record videos of their children and save these clips in a designated folder, which can be retrieved by the application and broadcast to TV by a simple push of a button. Once the video is broadcast to one of the TV channels of SSOK 2.0, it becomes an official channel available to anyone who has TV SSOK 2.0. This is a similar process to uploading a video to YouTube. However, unlike YouTube, which only allows access to recorded content, TV SSOK 2.0 enables the other viewers (e.g., similar age groups) to interact with a creator who uploaded content in real time from any location where users can access IPTV.

For these reasons, it is expected that TV SSOK 2.0 can encourage learners to sustain their motivation and to understand content through the enhancement of their immersion.

1.2. Living Stories (SK broadband)

The unique technology in 'Living Stories' includes 3D facial recognition and real-time automatic generation of facial expressions. Such technology enables embedding the face of a child into the face of a TV character in popular fairytales in more than 250 different scenarios as well as in a variety of educational content for English language learning. When a child takes a picture using the smartphone application and casts it onto the television, the character's facial expressions automatically change to match the picture, which then changes the narrative of the story being told. Furthermore, this technology contains a) a drawing function, which brings the drawings to life on the TV screen; and b) a talking function, which uses the child's voice for the characters showcased on TV. These features can be extremely beneficial in increasing a child's engagement with the material and have the potential to provide an excellent overall learning experience.

1.3. Kids World 2.0 (LG U+)

Kids World 2.0 focuses on fostering creative talents through 'TV to grow your thoughts while having fun'. This IPTV application includes all functions and contents previously described along with other unique things such as AI-based translation. For example, one can use the remote control to interact with the TV in Korean, and the AI can automatically translate the content into English, Chinese, or Japanese, reading them out loud in any of these languages in the pre-programmed content. This type of technology can also provide interactions in which a user asks for the translation of a specific word into English. For example, when utilizing the system for learning other educational content besides foreign language learning (e.g., math, history, and reading), whenever a learner wants, this technology can translate words and sentences written in Korean into other languages. This technology for educational TV provides users with a new kind of learning environment, one where users can take the initiative for learning and get information they need at any time, unlike the unidirectional content provision of traditional educational television.

2. Effectiveness of Educational Television

Educational television (ET) aims to provide a wide variety of content, including entertainment, cultural, and subject-specific programs to viewers of various age groups [2]. ET in the broad sense is broadcast for the purpose of enhancing the general knowledge of the public, while in the narrow sense ET's main purpose is to provide organized educational activities and lessons to learners with clear goals [3].

In contrast to traditional print media, ET enables the dynamic and vibrant delivery of learning content by using multimedia elements such as video, sound effects, animation, diagrams, and pictures, which makes it easier to attract learners' interest and attention [2]. With this advantage, ET has been regarded as an effective educational tool for learners ranging in age from preschoolers to adults in a variety of subject matters. The available material covers subjects such as language learning, medical content, and many others through formats that a) were designed to provide educational content in formal educational settings; or b) include educational messages in TV dramas, comedies, and documentaries from time periods as early as the 1930s [2, 3]. This section analyzes the characteristics and effectiveness of educational television in the following age categories: K-12, secondary, and adult education (See Table 1).

Table 1. Effectiveness of ET by Education Areas

	K-12 Education	Higher Education	Adult Education
Pros	Developement of intelligence & social communication Improving literacy	Teaching tool for direct instruction	Re-education for task-related skills & Enhance -ment of general knowledge
e.g.	Sesame Street	SURGE & CO-TIE (Colorado State Univ.)	Medisch Centum West (Dutch TV drama)

2.1. K-12 education

For quite some time, the main audience for many educational television programs has been children ranging from preschoolers to elementary school students and to date, countless children's education programs are still being produced and broadcast on TV. Accordingly, research has revealed that 58% of parents believe that educational television can be an important tool for the development of children's intelligence and social communication skills [4]. Indeed, many experts in early-childhood education have also claimed that various types of educational programs have been effective and successful in improving children's literacy, mathematical problem-solving skills, and scientific knowledge [5]. A quintessential TV show that underlies the positive perception of educational television for children is Sesame Street which, over the last fifty years, has been broadcast in more than 140 countries since it was first produced in the United States [6]. Sesame Street centers around episodes which take place in a virtual village called Sesame Street, where characters such as the Cookie Monster, Elmo, and Big Bird live. Sesame Street segmented educational objectives into three areas: (i) using symbols; (ii) improving cognitive processes, as well as (iii) understanding the physical environment and social settings [7].

Using symbols: Children are taught to recognize symbols such as letters, numbers, and geometric shapes and to use these symbols through simple manipulations.

Improving cognitive processes: Concepts of order and classification are taught so that children can handle objects and organize events. Children can also apply basic reasoning skills and foster an inquisitive mind that leads to problem-solving [8].

Understanding the physical environment and social settings: throughout the shows, Sesame Street also delivers concepts that correlate natural phenomena to general knowledge of how humans explore and interact with the natural world [7]. The program also presents the various roles that members in a social community have, as well as the forms and functions of various institutions

within that social community, which allow children to see a situation from various perspectives and to learn about social rules of conduct [8].

There have been many studies analyzing the educational effects of Sesame Street. A meta-analysis synthesizing the results of 21 reports with 10,596 children showed a positive effect size (d= .292) on average in three outcomes (i.e., cognitive outcome, learning about the world, and social reasoning) that are consistent with Sesame Street's educational purpose [9]. Sesame Street was also successful in a) expanding children's social contacts with other peers and with adults through positive reinforcement (e.g., praise, hugging, prizes, and smiling) from the characters in the show [10] and b) deepening the understanding about social issues and positively influencing social behavior through various materials and stories [11]. In addition, many researchers have demonstrated the effects of Sesame Street in improving children's language skills. Additionally, researchers have insisted that the content be optimized to develop children's lexical ability regardless of parents' education [12]. In an empirical study [13], kindergarteners who watched the whole season of Sesame Street got much better scores in a Metropolitan Readiness Test than those who did not.

As seen from the aforementioned results, Sesame Street, which symbolizes the beginning of educational television for children, has been effective in the formation of social knowledge and behavior, cognitive thinking, and language learning. In addition to Sesame Street, there have been similar educational programs for children such as Super WHY! and Daniel Tiger's Neighborhood. Through these TV shows, people can recognize television as an effective educational tool rather than simply a passive tool for entertainment.

In secondary school settings, instruction by educational television normally entails watching educational content integrated to the regular classroom curriculum as supplementary material in teacher-led instruction. The most frequently used educational television content in U.S. classrooms comes from Public Broadcasting Service (PBS), which provides systematic education of common knowledge in each field according to age [14]. PBS has been recognized as offering one of the best cultural programs in music, art, and literature. Examples of their excellent shows include (i) Michael Palin's Hemingway Adventure; a special program about Ernest Hemingway's writing, his personal life, and the world of his artwork; and (ii) Standard Deviants: Shakespeare, which showcases William Shakespeare's literary work. These shows are used as supplementary learning materials in literature lessons for the analysis of literary pieces with the keen touch of experts in schools. In addition, programs like (iii) American Masters, which introduces great American artists and their masterpieces; and (iv) American Photography, which sheds light on the history and development of American photography, are used to enhance learners' interests in these subject matters and to improve their understanding of content through visual resources and expert commentary.

Research on the effectiveness of educational TV has been carried out since the 1960s, a time in which it was most actively used. A meta-analysis comparing the instructional effect of television-based learning and traditional teacher-led instruction with 207 individual studies [14] revealed that secondary school students showed better performance in television-based learning than in traditional teacher-led instruction. In addition, results indicated that teachers and administrators showed a positive attitude toward the use of educational television in their classrooms. Research on educational television has continued to be carried out, but nowadays it is more focused on better understanding how it is used in countries which lack internet and computer availability for their entire population [15]. A study investigated the effects of educational television in Ethiopia. Results revealed that students were satisfied with educational TV, as it provided more

understandable and interesting learning content. Teachers were also pleased with the use of educational television since it can bring (i) improvement of academic achievement; (ii) students' immersion in learning; and (iii) sufficient learning materials. In Pakistan, where educational opportunities and social status of women are significantly lower than those of men, educational television has played a pivotal role in improving women's literacy through video recordings of school classrooms and also by enhancing their social consciousness and public opinion through TV dramas, news, and documentaries [16].

2.2. Higher Education

With the advent of the 'scanning disk' type of television in the early 1930s, many institutions of higher education (e.g., University of Iowa, Purdue University, and Kansas State College) operated their own educational television stations, which served as a teaching tool for direct instruction [17]. Instructors conducted lectures in an actual classroom, which was broadcasted by the institution's stations, and a two-way radio system assisted with their communication. This is similar to the current e-learning format. A typical example that was broadcast through this system was a program created for the armed services to train air raid wardens, ROTC students, and army field force reservists. A great number of research studies have shown that this type of instruction was an effective replacement to face-to-face teaching in terms of learners' performance, motivation, equity of education, and accessibility of learning. On the other hand, due to technical issues, the pursuit of a 'synchronous type of learning' through television and radio reached its limit, consequently not being able to resolve issues such as lack of concentration and engagement, miscommunication, and the absence of assessment instruments [18].

In the late 1960s, educational television served as a means to meet the explosive educational demand in higher education. As an example, in the state of Colorado, there were more than 10,000 engineers and scientists from industrial plants and government agencies in need of a college degree [18]. This outnumbered the spaces offered by the eight four-year colleges and ten community and junior colleges available at that time [19]. For this reason, Colorado State University launched two projects to use educational television: SURGE and CO-TIE.

SURGE and CO-TIE projects are different in their purpose, field area, and core subjects, but show similarities in terms of the operational method of educational television [19]. In a studio classroom, an instructor offered practical lessons for about 10 students in a face-to-face format. A total of three cameras recorded the instructor's lecture, the discussion between instructor and students, and all the learning activities, while one camera recorded the instructor's teaching materials. All recorded videos were delivered to SURGE and CO-TIE participants [19]. All participants came together in an off-campus classroom to view these videos at a prescheduled time. Participants' questions and discussion during and after the lesson were recorded again, and the videos were mailed to the instructors. After a few days, the participants received the instructor's response. From our current instructional perspective, the SURGE and CO-TIE Projects seem to have been inefficient and ineffective, but at that time, both projects showed the possibility of distance education provided by TV and demonstrated that television could be a good medium to deliver qualified curriculum to learners who could not attend face-to-face lessons due to distance and time constraints. In addition, since community and junior college faculty members also had access to television-based learning created by 4-year universities, these projects unlocked the potential for regional colleges to improve their curricula and teaching strategies. Moreover, many studies have demonstrated that television-based learning was not different from other types of instruction [20] and that it was considered even significantly better than traditional face-to-face classroom in terms of academic achievements [21]. At the time, this meant that educational television

could prove to be a good substitute for the traditional classroom environment.

However, in the 1970s, personal computers began to spread and rapidly replaced television in its educational role. In addition, the advent of the internet overcame several issues faced by educational television (e.g., the cost and time of development, inefficient or lack of mutual communication, difficulty in curriculum modification, among others), which led to a rapid decline in the use of educational television as a major instructional tool or delivery method for educational content. Nevertheless, several television shows and programs still play an important role in allowing learners in higher education to obtain general knowledge (e.g., TED talks).

2.3. Adult Education

Even though most ET programs for K-12 and Higher education focused on the improvement of learners' intellectual skills and cognitive outcomes, the role of ET for adults can be divided broadly into two main sectors: (i) programs offering (re)education for task-related skills and (ii) non-educational TV programs that increase general knowledge (e.g., cooking shows, yoga, tennis matches and other sports, meditation, dance, and fitness) [22].

(Re)education for task-related skills is an important way for employees to acquire or further develop specific knowledge and skills that businesses need, and many companies regard it as a foundation for ultimately increasing their competitiveness. A number of recent studies have shown that active participation in (re)education for task-related skills enhances employees' motivation and productivity [23]. Nevertheless, many companies are having difficulty encouraging employees to participate in in-company education because employees have to stop what they are doing to attend classes, which can be inefficient, time-consuming, and costly. For this reason, many companies (e.g., Samsung, GE, and Deloitte) have produced their own television-based education, which enables employees to receive the education needed to perform their work or to develop their own skills anytime and anywhere.

On the other hand, the most common use of educational TV for adults aims for the acquisition of general knowledge. According to a study [24], adults consider watching TV a part of their daily lives and have a high degree of confidence in the information they receive from TV programs. Therefore, if adult education can be defined as "a practice in which adults engage in systematic and sustained self-educating activities in order to gain new forms of knowledge, skills, attitudes, or values" [25, p.7], the content from many television programs can prove to be a useful learning resource for adults who already have self-determination skills and who are aware of what they already know, what they are interested in, and what they want to know. In other words, even if a TV program is not produced for educational purposes or does not include any specific educational content, adult viewers have the ability to acquire and utilize their own information and skills obtained from many existing TV programs. In this sense, adults are obtaining meaningful learning from many entertainment and leisure programs (e.g., cooking, yoga, tennis, and dance) through selective perception. For example, Medisch Centrum West, a Dutch TV drama set in a hospital, proved to be effective in expanding viewers' awareness of medical and health problems [26], which corroborates the fact that television programs can serve as transmitters of general knowledge and skills for adults.

Despite the many advantages and effects of educational television involving different age groups, this instructional tool still has shortcomings such as the one-sided delivery of information, a fixed-time broadcasting schedule, mechanical problems such as issues with reception, and content that is broadcast without any consideration to individual learners' characteristics and needs. However, the development of information and communication

technology has allowed some of these aforementioned shortcomings to be overcome by a replay, as well as by the participation of viewers through broadcasting station websites. Furthermore, as mentioned in the section of 'Analysis of Present Educational IPTV Programs', the creation of IPTV makes it possible for users to learn content by doing and experiencing different educational environments at their individual learning pace and in a self-directed manner.

Nevertheless, educational television that adopts new technology and a different way of delivering content (i.e., two-way communication) still needs to use different approaches for their educational purpose/value and instructional design, when compared to the traditional educational content broadcast by television.

III. Suggestions for Designing Educational IPTV Program

Existing IPTVs have tried to apply a constructivist approach in their design of educational TV programs. However, their attempts have resulted in programs that lack educational factors. In order to design IPTV programs that are utilizing constructivism in its fullness, the authors of this article suggest three educational principles; Service-Dominant (SD) Logic as an educational service design principle, Goal-Based Scenario for instructional design, and IPTV as state-of-the-art technology innovation.

1. SD Logic as an Educational Service Design Principle

TV-related technology has been developed rapidly, especially in the area of video displays such as CRT (cathode-ray tube), Flat panel display (LCD or plasma), and OLED (organic light-emitting diode), used in modern TV sets. On the other hand, since technology is just a vehicle to deliver content, it is very important to know how to design educational TV programs. So far, most TV educational programs focus on delivering content unilaterally, which causes issues such as a lack of learners' active participation, flow, social interaction, and meaningful experiences in learning. Those play an important role in the achievement of learning. In order to solve these problems, ITV (interactive Television) was developed, integrating traditional television technology to data services. This two-way cable system allows users to interact with it via commands and feedback. The major aim of ITV is to provide an engaging experience to the viewer. It allows various forms of interaction, such as interacting with the TV set, program content, TV-related content, TV services, and closed-circuit interactive television

Educational TV should lead learners to intellectual stimulation by thinking about the content being watched. For example, the well-known TV program Dora the Explorer, which came to TV in 2000, provides an environment in which a destination needs to be reached and a problem needs to be solved. A major characteristic of this program is that children are encouraged to talk back to the TV characters and repeat everything three times and the talking map is very insistent on having viewers tell Dora time and again where to go to get to the destination. Moreover, after the questions, Dora gives time for learners to think and answer.

Dora the Explorer is an example of a service logic perspective. Service dominant logic (S-D logic) (Table 2) centers on the participants, processes and resources that interact to create value in service systems [27]. The value creation in this view is tied to the value-in-use (S-D logic), in contrast to the value-in-exchange (G-D logic), which regards the creation of value as a series of activities performed by producers. Instead, S-D logic focuses on the idea that value is always co-created jointly and reciprocally, and the roles of producers (TV program PDs) and consumers (viewers) are not distinct in their interaction among providers and beneficiaries [28].

Table 2. S-D logic vs. G-D logic on value creation in TV-based Instruction

	S-D Logic	G-D Logic
Value driver	Value-in-use or value-in-context	Value-in-exchange
Creator of value	TV company (program producers), learners (viewers)	TV company (program producers)
Process of value creation	TV company (program producers) propose value through market offerings. Learners (viewers) continue value-creation process through use	TV company embeds value in 'goods' or 'service', value is added by enhancing or increasing attributes
Purpose of value	Increase adaptability, survivability, and system well-being through service (applied knowledge and skills) of others	Increase wealth for the TV company
Measurement of value	The adaptability and survivability of the beneficiary system	The amount of nominal value, price received in exchange (e.g. watching pay)
Role of company	Propose and co-create value, provide service	Produce and distribute value (or TV programs)
Role of learners (viewers)	Co-create value through the integration of company-provided resources with other private and public resources	To use up or destroy value created by the TV company

* Note: This table is modified from one research study's original idea [27]

For learners to have optimal learning experiences, they need to co-create value along with the educational TV programs through a reciprocal and mutually beneficial relationship. Therefore, a learner should be regarded as a co-creator of value along with educational TV programs, not as a mere customer who obtains the right to watch TV shows. Through the perspective of G-D logic, a TV company's production of programs creates value for customers through producing and broadcasting an educational program. Value is created by the firm in the form of a good, which is exchanged in the marketplace for money and measured by this exchange transaction [27]. However, according to the S-D logic, a TV program is only an aspect of the value creation. The value creation occurs when learners or viewers use it in the context of their daily lives. That is, TV program producers and learners are co-creators of value; producers apply their knowledge and skills in the creation of programs (the goods) and learners apply their skills in the use of these programs in the context of their own lives.

2. Goal-Based Scenario for Instructional Design

In this section, the goal-based scenario (GBS) will be introduced as a means to develop Service-Dominant (S-D) Logic-based educational TV programs. GBS is an instructional design model based on the interests of learners and the application of specific skills to real life situations. Also, it is a learning-by-doing simulation in which learners are provided with various tools and information, achieving pre-set learning goals in the course of carrying out realistic tasks. In other words, GBS pursues its goals by using relevant content knowledge to help achieve target skills and goals [29].

GBS can be regarded as a model that pursues both the characteristics of constructivism and objectivism: There are constructivist features which create an environment that allows learners to select various educational resources for task-based context learning and task performance; these learning resources are provided according to an elaborately designed scenario; additionally, the objectivist features take place within the goal setting aspect of GBS.

The basic structure of GBS for educational TV programs is in [Figure 1].

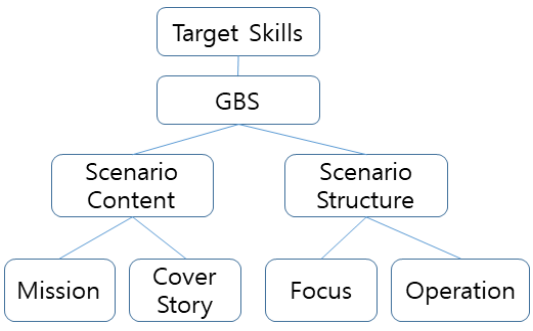

Fig. 1. Basic structure of Goal Based Scenario

TV producers (the instructors or instructional designers) have a top-down approach to teaching and learning, and viewers (learners) take a bottom-up approach. In other words, the instructor envisions teaching and learning with a set of goals that a learner wishes to achieve through GBS, and the learner participates in the learning through the context and structure of the activities provided via GBS.

The components of GBS can be described as follows: The target skill refers to a set of functions that a TV producer (an instructor or instructional designer) wants learners (viewers) to achieve through GBS. These functions are presented to learners in such a way that they can be taught directly to students. GBS's learning objectives are generally process and content knowledge. Process knowledge refers to knowing about how to perform functions that contribute to achieving objectives, and content knowledge refers to the information required to achieve goals [29].

The mission is presented in a form similar to the task which the learner performs in the real world. Of course, a very close semantic relationship should be secured between this task (mission) and the goal. In other words, the goal must be accomplished as the mission is in progress.

The cover story serves to elaborate the task by providing a story format, providing the need to learn, and designing the situations in which actions take place. This leads to the learners' understanding of the mission, providing detailed information necessary for mission performance, and motivating them to learn through factual and interesting narratives. The story plays a very important role in allowing learners to participate from the beginning. Therefore, each element of the story must be realistic; that is, the story should match the situation where the target function is naturally present. Missions and stories are related to the contextualized scenario.

Focus and operation center around how the task is performed. Focus refers to a learner's task, determines the type of activity to be performed, and provides an organizational framework for such task. There are four types of focus tasks: design, diagnosis, discovery, and control. Through each step, the learner has the opportunity to improve his or her problem-solving skills. The activity is to allow the learner to anticipate what he or she needs to do in order to accomplish the task and place it on the story line of the scenario [36]. Through these tasks, learners are able to achieve the goals they have been assigned.

Furthermore, there are six steps for designing instruction with the GBS model: (i) Identifying a set of target skills; (ii) Developing Missions which require the use of the target skills, (iii) Choosing a Focus, (iv) Creating a Cover Story that envelops the Mission, (v) Planning the Operations; and (vi) Building learning environments to support the target skills.

Table 3. Six steps for designing instruction with GBS model

Step	Details
1	Identifying a set of target skills e.g., Mastering basic conversation, reading and writing
2	Developing missions which require the use of the target skills. e,g, Being competent to secure a teaching position in China.
3	Choosing a focus e.g., Discovery: discovering more efficient ways of learning and sharing those approaches with the whole class
4	Creating a cover story that envelops the mission e.g., A group of peace corp. volunteers is going to China to support the "Hope" educational project.
5	Planning the operations e.g., Searching for internet-based multimedia Chinese learning software on the world-wide web
6	Building learning environments to support the target skills. e.g., Making a TV program based on AR for mastering basic conversation, reading and writing

Identifying a set of target skills: GBSs are effective because they enable students to do something meaningful. By making the pedagogical goals of the GBS explicit, the remainder of the design process is simplified. Specifying a set of meaningful target skills is relatively easy in case

the focus of program is to prepare students to fill well-defined roles with clear associated skills. One way to produce a set of target skills is to examine the competencies of a professional in their domain. To teach about plants, focus on the work of a botanist or weekend gardener; to teach about current events, look at how an intelligent adult can "read through" a speech or form opinions about government programs; to teach business, interview stockbrokers and CEOs. Examples of target skills include mastering basic conversation, reading and writing; being familiar with a culture, and knowing language teaching skills.

Developing missions which require the use of the target skills: Once a designer has identified the target skills for a GBS, he or she must next specify a mission; that is, a particular achievement that will motivate the student to engage in the GBS and require the student to acquire these target skills. An explicitly defined mission will, in turn, guide development of the remaining pieces of a GBS. It is important to point out that a mission should not be confused with a skill. A mission is something a student achieves by applying any number of skills. In other words, a mission is a state or condition, whereas a skill is what is used to bring that state or condition about. An example of mission is being competent to secure a teaching position in China.

Choosing a focus: A GBS designer must first decide whether the mission is best served by having the student pursue a design, control, discovery, or explanation task (or some combination of these). This decision leads to the establishment of the iterative sequence for the GBS. Each class of focus task carries with it a natural iterative sequence; that is, a natural sequence of steps that people follow when performing the task. Examples: For a GBS with a design focus, the student repeatedly generates a part, integrates it into the whole, then tests the whole. If the focus is explanation, the student might conduct a test, observe it, then produce an explanation. Observing phenomena and stripping it down to necessary and sufficient conditions is central to a discovery task. A control-based GBS inevitably revolves around decisions such as detecting a state of affairs, gathering evidence, then choosing between alternative plans. Other examples of focus include learners finding and choosing learning materials on the Web; designing their own study plan and controlling their own progress; discovering more efficient ways of learning and sharing those approaches with the whole class; helping each other to improve teaching skills through practice.

Creating a cover story that envelops the mission: The cover story is the context which unites the other components of a GBS. After identifying the target skills, the mission, and the focus, the designer must decide on the general context under which skills are learned and applied in the service of the mission. Because people use context to help them recall relevant skills, the cover story must closely match the situations in which the target skills are naturally employed. If, for example, a student is being trained to fill a particular job, the best cover story is the setting in which the job is conducted. Let's take an example of a cover story; A group of peace corp. volunteers is going to China to support the "Hope" educational project. They will be assigned to teach English in different countryside high schools for 2 years. However, none of them speak Chinese and they will have to be fluent before they leave. A summer intensive Chinese class is set up for them to learn the Chinese language and culture. Unfortunately, Chinese textbooks adequate to meet their needs do not exit. They will have to look for and select their own learning materials, study in groups, then come to class to share and teach each other. A great number of CALL (computer-assisted language learning) programs and courseware will be integrated to help create an authentic language learning environment.

Planning the operations: Once the essential components of the GBS are established (i.e., the competencies the student is to develop, the goals

the student can adopt, and the context in which they are achieved), it is time to turn to the scenario operations; that is, specific tasks to be accomplished. An example of planning the operations includes these tasks: (i) Students will search for internet-based multimedia Chinese learning software on the world-wide web (WWW) and provide the teacher with the URL and a brief description of the learning software; (ii) The teacher will check the materials, rank them from easy to difficult, and link them to the class homepage; (iii) Under the teacher's supervision, students will choose programs that are appropriate to their level and utilize them for individual work throughout the semester; (iv) Students will search for and curate materials regarding the Chinese culture (e.g., customs, geography, countryside education status, socioeconomic conditions and cost of living in the countryside of the country, among others).

Building learning environments to support the target skills: When designing a GBS, it is important to determine how the GBS will be helpful to students in terms of achieving the mission and acquiring the target skills. The designer must decide what types of support to give the student and in what ways that support will be made available. These decisions require the designer to consider appropriate cases to refer to, the feedback to provide, and the media by which information will be delivered.

3. IPTV as state-of-the-art technology innovation.

Advances in digital technology have facilitated the creation of new broadcasting media integrating several means of communication. Such advances have also promoted the convergence between broadcasting and communication. A typical example of such convergence is Internet Protocol Television (IPTV). IPTV is a broadcasting service that transmits content over a high-speed internet network. Because all content is provided through a two-way communication network instead of a traditional broadcasting network, users can interact with content while enjoying services such as browsing the web, games, shopping, as well as real-time broadcasting (simulcasting) and video on demand (VOD) without any concern about choosing channels or waiting for the broadcast of the desired TV content [30].

Although the aforementioned services can also be provided via current television technology (e.g., Smart TVs and micro consoles such as Apple TV and Chromecast), there is one unique characteristic of IPTV: Two-way communication-based educational content. IPTV has mostly played the role of a traditional deliverer of content, but recently, in some countries, it has been used as a medium to provide stable and interactive instructional services which personalize communication in a variety of fields. Additionally, the use of IPTV enables the expansion of learning opportunities by providing high quality education services to low-income students or those in distant and secluded areas, dependent solely upon a connection to the internet through a simple, easy to install set-top box, and not tied to any other expensive devices (e.g., Smart TVs, flat screen monitors, etc.) [31]. Moreover, the learning affordances provided by IPTV can have a positive effect in reforming the educational environment and overcoming some of the limitations of e-learning: reduced opportunities for engagement, low interactivity of content, and, at times, high emphasis on passive skills (e.g., reading and listening) [32].

Considering the advantages of educational IPTV, in South Korea, one of the leaders in the field of information and telecommunication technology in the world, 45% of the population consists of IPTV subscribers [33]. Additionally, Korean telecom companies (i.e., KT, SK Broadband, and U+), which provide high-speed internet network service all over the country, are consistently working to develop educational IPTV content in an attempt to bring forward new technologies and media content for the enhancement of learning opportunities. These companies have two common traits: (i) their target population consists mainly of preschoolers;

and (ii) the development of educational content focuses on utilizing advanced technology (Augmented Reality and Artificial Intelligence), both of which allow users to have an interactive and direct experience with the instructional content.

Preschooler-Specific Content: Video clips specifically developed for preschoolers are increasing their popularity worldwide; therefore, mobile video platforms and IPTV operators focus on the development of specific content for children. An example is YouTube Kids, a smartphone application developed by Google which provides exclusive content for children, with a weekly audience of 8 million people around the world [34]. In South Korea, the market scale in children education is growing at more than $40 billion, and preschooler-centered Video on Demand (VOD) is becoming a major trend [33]. In addition to the expansion of children's content, the unique characteristics of IPTV such as 3D, Augmented Reality, and bi-directional content allow for the creation of educational content which can increase engagement with the material, as well as allow children to get immersed and actively interact with the content [34].

Advanced Technology: There are two main platforms which integrate IPTV. The first is Augmented Reality (AR), which utilizes a combination of virtual objects (images, text, sound, motion, etc.) and a convergence of different media in real time to provide information, interact with the user, and expand sensory experience through 3D images that mimic real life [35], The second is Artificial Intelligence (AI), which can be utilized for (i) allowing users to find desired content through voice commands and the personalized recommendation of content based on the collection of data on user preferences; and (ii) cooperating with an internet content service with advanced AI technology to provide neural machine translation, and integrating it into educational curriculum for interactivity and language teaching purposes. For instance, if a user interacts with IPTV saying something in Korean, AI enables IPTV to automatically translate it into English, Japanese, and/or Chinese in real time, and to display such translation in both speech and text formats. Furthermore, when a user interacts with a character via the remote control and asks for the translation of a word or expression, the character is able to respond to such request. Since the accuracy of voice recognition is beyond 95%, this type of interaction allows users to practice foreign languages through conversations, games, and engagement with content, as opposed to the more traditional, fixed curriculum, which limits the amount of vocabulary and expressions users are exposed to.

Table 4 summarizes the advanced technologies of current IPTVs with Pre-schooler specific content and their functions.

Table 4. Characteristics of main IPTV in Korea

	TV SSOK 2.0	Living Stories	Kids World 2.0
Technology	Hyper-broadcasting tech, based on AR	Real time automatic generation of facial expressions	AI-based translation
Interaction	Through virtually animated characters	Through facial expressions	Through users' requests for translation
Function	Creating DB of user's detailed content history	Drawing & talking	Automatic translation of Korean into other languages

Despite of using different technologies, a common feature of these IPTVs is that they can all respond to context-based needs. In other words, it is possible to show a different reaction according to a user's current needs or learning state, rather than pre-determined or preset content or reaction. This leverages the users to perform given tasks at the optimal challenge level [36], resulting in enhanced engagement and immersion in learning [37].

Nevertheless, there are still some limitations in each IPTV. In the case of "TV SSOK", high-tech adaptation errors occur so frequently that users cannot get immersed into their learning. In "Live Stories," due to the steep learning curve involved in

utilizing state-of-the art technology, all educational activities and functions in IPTV have not been fully used. Finally, technology and contents in "Kids world" is limited to exclusive educational content for language learning. We contend that the biggest issue regarding educational IPTVs is that most of the content offered to users was not designed nor developed using systematic instructional design principles such as GBS, as previously mentioned in this article. It is important to highlight that in order to reduce costs, content development was done without considering IPTV interactive characteristics. Instead, the design and development of these programs was carried out through a simple addition of advanced functions to already existing educational content. In view of this, we argue that this is a key area in need of improvement in future educational content development for IPTV.

IV. Conclusion

This paper described new trends of TV-related technology, including IPTV with AR and VR in Korea. It also discussed the effectiveness of educational TV for a variety of educational levels—from K-12 to higher education and adult education. Finally, an overview of learner-centered and TV-based education was given, focusing on service dominant logic and instructional design for S-D logic-based educational TV programs.

Technological innovation has a great potential to change society and education. However, "the acceptance or rejection of an invention, or the extent to which its implications are realized if it is accepted, depends quite as much upon the condition of society and upon the imagination of leadership as upon the nature of the technological item itself [38, p.24]." In case of an innovation such as educational IPTV utilizing AR and VR technologies, a variety of educational factors should be considered carefully, and a systematic and systemic approach is recommended in order to obtain the most successful results through the use of these forms of educational television.

Additionally, the co-creation of value that learners can experience in the process of applying knowledge and skills acquired from educational TV programs should be recognized as a core factor in designing and developing educational TV programs. That is, learners watching educational TV programs should be co-creators of value along with producers of educational content and not simply passive users of one-way delivery of instruction.

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