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Investigating Teachers' Perception of the Educational Resource Sharing System in Korea: A Qualitative Research

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The aim of this research is to understand the perceptions of primary and secondary teachers regarding educational resource sharing systems(ERS) by using a qualitative approach. This study conducted Focus Group Interview(FGI) with 20 primary and secondary school teachers. Interview data were analyzed through inductive content analysis method. The results are as follows. First, teachers placed significant emphasis on high-quality, convenient functions, and reward system for sharing resources. Specifically, teachers identified the necessity for a diverse array of materials, systematic categorization of these resources, and the provision of monetary compensation as essential components. Second, the study participants advocated strategies for revitalizing ERS including enhancing accessibility, constructing user-friendly features, increasing awareness, and establishing a reward system to incentivize the resource sharing. In particular, teachers proposed strategies such as developing mobile-based services and AI-driven data recommendation system. These results provide actionable insights for stakeholders engaged in the design, implementation, and evaluation of resource sharing platforms.

Keywords : Educational resources, Educational resource sharing system, Focus group interview

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Introduction

With the acceleration of the Fourth Industrial Revolution and technological advancements, digital transformation is spreading across the social structure. Particularly in the education sector, the "digital transformation of education" is taking place, applying cutting-edge technologies such as artificial intelligence, big data, and cloud computing to learning environments. These shift has created new forms of educational resources that are significantly different from traditional formats, including augmented reality (AR), virtual reality (VR) and interactive e-books. In addition, the COVID-19 pandemic fueled the rapid proliferation of online education, along with an increased adoption of hybrid courses, which combine elements of both online and face-to-face learning, giving rise to multimodal learning experiences and rising a need to equip educators with skills and technologies required to teach across these varied modalities (Pelletier et al., 2023). This places new demands on teachers to quickly adapt to new educational resources.

At this point, there is a need to shift the paradigm of educational information resources from ownership to sharing (MOE, 2022). This is also in line with the UNESCO (2019) recommendation for sharing Open Educational Resources to enhance accessibility to educational materials. This demonstrates that the production and use of educational resources should not be limited to individual teachers. Rather, they should be carried out between teachers and within the teacher community. By creating quality educational resources, teachers review and reflect on the content they produce. This process can lead to an increase in teacher professionalism, and teachers can feel satisfaction and pride from sharing the materials they have carefully created (Kim et al., 2021). On the other hand, teachers who receive educational resources from sharers can shorten the time spent on lesson content design and production, experiencing convenience (Park & Moon, 2015). The fact that valuable educational resources can be used appropriately in the field of education without being discarded is also a significant advantage of resource sharing. Thus, sharing resources can lead

to positive changes within the teacher community, such as enhancing teacher professionalism and promoting teacher efficacy.

Educational resources are being freely shared on various sites, notably including 'OER Commons' and 'MIT OpenCourseWare'. In Korea, with the spread of the Internet, teachers became able to share resources they have produced online, leading to the establishment of various online communities. Especially on 'Online Teacher Learning Communities', teachers actively share knowledge, experience, and educational resources related to teaching for educational purposes, and continuously communicate with each other (Seo, 2011). Within this place, educational resource for teaching is produced, shared, and reprocessed (Kim, 2008; Kim, 2021). Considering the frequent sharing of resources in online teacher learning communities and the benefits of resource sharing, an "Educational Resource Sharing System(ERS)" has emerged to share and distribute educational content. ERS refers to an online system where teachers can freely search and download educational content, and share educational resources they have created with others. ERS has been built under the name "Education Information Management System" since 2002, and currently, about six national and private material sharing centers are under operation.

Considering the benefits and need of educational resource sharing, it is necessary to manage quality resources produced by teachers so that they can be easily shared. There is a need to compile resources so that teachers can find the resources they need from a vast amount of educational resources and use them in class. Also, overall management of the production, sharing, reproduction, and consumption of educational resources must be carried out (KERIS, 2012). Moreover, as the increase in digital materials and the expansion of education using digital materials are expected, efforts are needed to activate ERS for resource sharing and strengthen related services (MOE, 2022). Especially, as teachers are more willing to use ERS continuously if they perceive the services as convenient and systematic, it is necessary to prepare an ERS operation plan that teachers can easily use (Kim et al., 2013).

However, many domestic studies have been conducted on constructing system

structure and detailed features for ERS (Kim, 2005; Park & Kang, 2011; Park & Moon, 2015). Research investigating teachers' perceptions of ERS has rarely been conducted (Cho et al., 2013; KERIS, 2012). Where existing research primarily focuses on the construction of Educational Resource Sharing Systems (ERS), they might overlook the actual needs and perceptions of the end-users, who are the teachers in this case. Gaining insights into how teachers perceive and utilize ERS can lead to improvements and provide more substantive data for educational policies and ERS operational strategies. Therefore, this study aims to explore teachers' perception of ERS so that the entire process of resource production, sharing, and reproduction can be carried out smoothly. Specifically, considering the main users of the ERS, this study aims to explore the essential components of the ERS and insights to revitalize ERS perceived by primary and secondary teachers. The research questions set in this study are as follows:

First, what are teachers' perceptions regarding the essential components of ERS?
Second, what are teachers' perceptions to activate the operation of ERS?

Educational Resource Sharing System

The concept of Educational Resource Sharing System

Educational resource sharing systems (ERS) were variously named as "Educational Information Sharing System", "Knowledge Sharing Platform", "Resource Sharing Platform", and "e-Learning Content Sharing System". In domestic studies, the "Educational Information Sharing System" has been defined as a service that shares and distributes related materials in a database for the purpose of freely using educational resources (Cho et al., 2013; Park & Kang, 2011). In international studies, Shankar (2022) defined a resource sharing platform as a space where voluntary

sharing of materials and free downloads occur, while Lüpkes and Reif (2019) described it as a space where users share intellectual property, and instructional materials. Additionally, Xu and Xia (2010) defined it as a space where anyone can freely search, use, share, and manage digital teaching and learning resources.

Upon reviewing existing domestic and international studies related to the teaching and learning resource sharing platform, it was found that they all possess identical components such as resource uploading, sharing of resources and educational information, downloading, and user participation. In summary, ERS can be described as an online system where teachers can freely search and download educational resources and further share the educational resource they have created with others. The concept of ERS as defined in existing research is presented in Table 1 below.

Table 1

Definition of ERS in existing research

Author	Definition
Chen et al. (2011)	A space where teachers exchange and share teaching materials and professional experiences
Cho et al. (2013)	A service that shares and distributes educational information collected from various sources to meet the demand for educational content
KERIS (2012)	A system that can fully manage the creation, processing, distribution, consumption, and sharing of educational content
Lüpkes & Reif (2019)	A space where users publicly share their intellectual property and teaching and learning materials
Park & Kang (2011)	A space where teachers can freely download and use educational content for education or research purposes, or publicly share content they have created
Shankar (2022)	A space where users voluntarily share materials and freely download and utilize them
Xu & Xia (2010)	A space where anyone can freely search, use, share, and manage educational resources

Cases of Educational Resource Sharing Systems

Educational Resource Sharing Systems are operated across multiple regions. A notable example is the 'OER Commons', managed by the Institute for the Study of Knowledge Management in Education (ISKME) in the United States. 'OER Commons' serves as an open-access online library, enabling teachers and other individuals to search for and locate educational resources as well as freely available instructional materials. Also, 'MIT OpenCourseWare' offers educational materials from MIT courses at no cost, including syllabus, online textbooks and course videos. Furthermore, 'MERLOT' provides an extensive range of learning resources, categorized by specific discipline.

A variety of ERSs are also being operated in South Korea. Approximately six ERSs are in operation. These systems all provide services that allow free downloading of teaching and learning resources, and feature functionalities that enable sharing of resources among users. ERS can be categorized based on the operating entity: systems operated by national agencies including the Ministry of Education, those led by private companies, and those managed through voluntary operation by teachers. Among these, the majority are operated by national agencies. Three out of six systems (50.0%) were operated under the guidance of national agencies, two (33.3%) under private sector, and one (16.7%) managed through the voluntary efforts of teachers. Specific examples and characteristics of the ERSs are as follows in Table 2.

'Edunet T-CLEAR', 'ITDA', and 'Wedorang' are ERSs operated by the Korea Education and Research Information Service (KERIS). T-CLEAR in 'Edunet T-CLEAR' stands for Teacher-Curriculum, Learning, Evaluation and Activity Resources, and the site provides services such as teaching and learning resources, evaluation materials, curriculum, and educational policy resources. It is an integrated educational information support service equipped with various features such as online experiential learning and authoring tool. 'ITDA' is a teacher-exclusive production platform established by the Ministry of Education, 17 metropolitan and

Table 2

Cases and characteristics of ERSs in Korea

Operating Entity	Name	Characteristic
National agencies	Edunet T-CLEAR	Provision of elementary and middle school instructional videos and evaluation questions, examples of SW & AI research schools, related curriculum, educational policy materials.
	ITDA	Service for easy content collection and convenient lesson material creation, sharing with teachers, and communication.
	Wedorang	Online learning community service where teachers can create classrooms to share resources, assignments, and discussions with students.
Private companies	T-Sherpa	Online free learning content platform for teachers provided by Chunjae Education.
	i-Scream Edu	Digital elementary education content platform operated by i-Scream Media.
Voluntary operation by teachers	Indischool	Nationwide online and offline teacher community for elementary school teachers, including SW & AI, provision of various teaching materials.

provincial education offices, and KERIS for the creation and utilization of educational resources. It offers authoring tools for creating teaching and learning resources, and approximately 92,000 educational contents are shared. 'Wedorang' is an online learning community service where teachers can create classrooms to share resources, assignments, and discussions with students. Within 'Wedorang', services for sharing and utilizing teaching and learning resources in the teachers-only community space are active.

'T-Sherpa' is a platform operated by Chunjae Education and its services are divided into kindergarten, elementary school, middle school, and high school. It mainly provides various contents based on textbooks produced by Chunjae Education, and there is a 'Teacher Sharing Resources' space where teachers can freely

share their created resources. 'i-Scram Edu' is a digital elementary education platform composed of educational contents for all grades and subjects of elementary school. It mainly provides content based on textbooks published by i-Scream Media, but also offers services based on other textbook contents. Like T-Sherpa, certified teachers can share resources they have created in a dedicated space. The site implements a premium pricing plan that requires payment for resource downloads and distributes a certain profit to the teachers who provided the content.

'Indischool' is an online teaching and learning resource sharing platform voluntarily built by elementary school teachers. Any member who has received teacher certification can freely share and download resources. Within Indischool, community features that support teachers' interaction are highly active, and the sharing, reprocessing, and re-uploading of resources are easy, which facilitates active resource sharing.

Sharing of Educational Resources and Related Research of ERS

The advancement of technology has not only led to the diversification of instructional resource types but also changed the way resources are shared. Traditionally, instructional resources were shared within a limited group of people within a physical distance or through email or fax (Littlejohn & Margaryan, 2010). With the proliferation of the Internet, teachers can now share resources with various communities online without spatial or temporal constraints. Specifically, online teacher learning communities have been created where knowledge and experience related to education are shared, and resources for effective teaching are exchanged (Kim, 2008; Kim, 2021; Seo, 2011).

Sharing resources has been reported to have positive effects on teacher professional development, teacher efficacy, and student academic achievement. Kim et al. (2021) highlighted that teachers enhance their professionalism through trial and error and reflective thinking while creating educational content. Sharing self-made

content with other teachers has been reported as a positive experience that brings fulfillment. Lee and Lee (2020) confirmed that knowledge sharing in online teacher learning communities positively affects teacher professionalism, and teachers' knowledge-sharing activities influence teacher professionalism through teacher efficacy. Lee and Jung (2011) reported that students of teachers who share instructional resources with colleagues showed significantly higher academic achievements, indicating that resource sharing positively affects student academic achievement. Additionally, teachers who download shared resources can experience the effect of reducing the time to create instructional resources (Park & Moon, 2015). Thus, sharing instructional resources can be considered a key factor that positively affects the sharing teachers, receiving teachers, and the students they teach.

Studies on ERS have mainly focused on building systems or services that enable resource sharing. Kim (2005) devised a system operation plan where resources registered by the sharer in the database are transmitted to the nationwide shared server. Park and Kang (2011) proposed a model for an "Educational Information Usage System" where teachers can freely use or upload educational content. Park and Moon (2015) conducted interviews with teachers to design a resource curation system that preserves and shares instructional resources produced in elementary, middle, and high schools. They considered interview results such as teachers' preference for resources produced by fellow teachers, the use of folder functions for resource categorization, and preference for various search functions and editable resources to propose a digital curation system that enables resource reuse and sharing. Besides system construction, studies exploring the perception of the teachers using ERS have also been conducted. Cho et al. (2013) analyzed teachers' requirements for the revitalization of the "Educational Information Usage System" and derived nine requirements, including immediate information provision, active promotion, latest educational information, editing function, specialized search function, copyright support, rewards, personal information protection, and open market environment. They proposed measures for active operation based on these requirements.

In summary, ERS are online systems where teachers can freely search, download, and share educational content. Sharing resources is vital as it can lead to the enhancement of teacher professionalism, increased teacher efficacy, positive effects on student achievement, and reduced time in creating instructional resources. Existing studies mainly deal with initial system or service construction, whereas teachers' perceptions of ERSs is under-explored. Therefore, this study aims to explore teachers' perceptions of the essential components and activation strategies of ERS.

Method

Participants

The study conducted Focus Group Interviews (FGI) with current teachers to explore their perceptions of essential components and strategies for operationalizing of ERS. Research participants were recruited through snowball sampling. Participants were recruited starting with a teacher who had experience with using ERS. The recruited teachers consisted of 12 elementary school teachers and 8 secondary school teachers, totaling 20 teachers selected as research participants.

The researcher explained the purpose and content of the study to those who wished to participate in the interview and obtained consent for participation. The recruited participants were divided into three groups, and a total of three FGIs were conducted. The specific background of the FGI participants involved in this study is as shown in Table 3 below.

Table 3
Research participants

Category		Number of participants	Percentage (%)
Gender	Male	11	55
	Female	9	45
Experience	Less than 10 years	6	30
	10 to 15 years	7	35
	15 to 20 years	5	25
	20 years or more	2	10
School Level	Elementary School	12	60
	Middle School	4	20
	High School	4	20
Total		20	100

Measures

The study constructed a questionnaire by referencing the analysis of prior research and the open-ended question method of Krueger (2014). The open-ended questionnaire was organized into five stages as suggested by Krueger (2014): opening question, introductory question, transition question, key question, and ending question, with the number of questions limited to 1-2 per stage to ensure ample response time for participants. The questionnaire was designed around topics related to the ERS's essential components, barriers to use, functions required for activation, usage examples, and strategies for operational activation. Specific questions are as shown in Table 4. The questionnaire used in this study was revised and supplemented through the review of one Ph.D. in Educational Technology and one doctoral candidate student with rich experience in qualitative research.

Table 4
Open-ended questionnaire

Stage	Question
Opening and introductory question	Could you please provide your name and a brief introduction of yourself?
	What are the resources most frequently shared and used within ERS?
Transition question	What elements do you think hinder the use of ERS?
Key question	What elements do you believe are essential to have in ERS?
	What could be the strategies for activating the operation of ERS?
Ending question	In what direction should ERS be operated in the future?
	If there is anything you have not mentioned, please feel free to share.

Procedures

The study conducted a total of three Focus Group Interviews, dividing the research participants into three groups. The schedule for the FGI was determined by investigating the times when the research participants were available for interviews, and the interviews were conducted from October 16, 2022, to October 18, 2022. Considering that the research participants resided in various locations, the interviews were conducted via Zoom. Each interview lasted approximately 1 to 1.5 hours, and with the prior consent of the participants, both video and audio were recorded. Subsequently, the interview content was transcribed, and the data were analyzed based on cross-validation by the researcher, one master's student, and two doctoral students. The research procedure is illustrated in Figure 1.

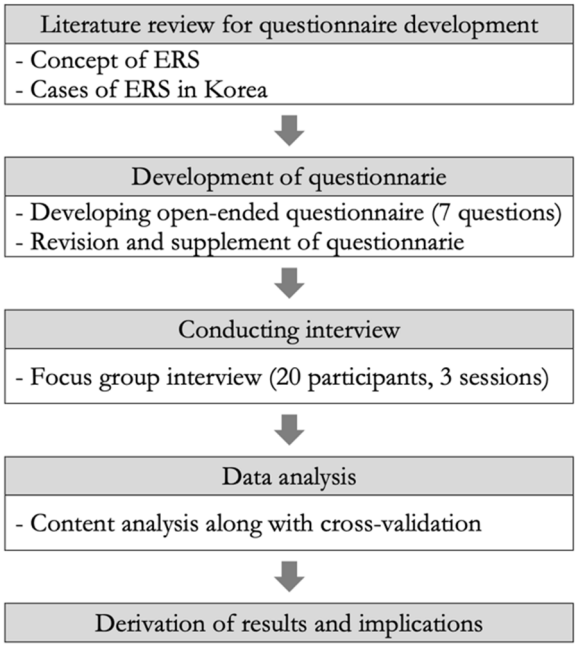

Figure 1. Research procedure

Data analysis

This study used the content analysis research method. The study applied the principles of inductive content analysis proposed by Elo and Kyngäs (2008). Inductive content analysis is a convenient method for systematically organizing and analyzing data, and it allows for the derivation of concepts that explain a phenomenon. The inductive content analysis suggested by Elo and Kyngäs (2008) consists of three stages: open coding, creating categories, and abstraction. Based on this method, the collected data were analyzed as follows in this study.

First, open coding was conducted. Open coding is a process of freely setting categories by repeatedly reading the collected data. The interview transcripts were read repeatedly, and words, phrases, and sentences related to the question content were underlined. Keywords were then extracted from the underlined parts, and categories were derived based on these keywords.

Second, categories were created. Creating categories involves cross-examining the freely derived categories from open coding and generating a hierarchy of categories. In this stage, the set categories were repeatedly compared and analyzed to ensure that they adequately encompassed the responses of the research participants. The process also involved defining the upper and lower categories among the derived categories.

Third, the abstraction process was carried out. Abstraction is the final stage of inductive content analysis, where the list of categories is reviewed, and the final categories are named. The names of the derived categories were repeatedly reviewed to ensure that they were composed of words that appropriately included the semantic units within the category. The names of the categories were then finalized. To ensure the validity of the categories, the analysis results were reviewed and conducted by one Ph.D. holder and doctoral candidate who previously conducted qualitative research.

Results

In order to understand the perceptions of primary and secondary school teachers regarding the essential components and operational strategies of ERS, interviews were conducted. As a result, two main categories, seven subcategories, and 17 semantic units were derived. The specific research results are as shown in Table 5.

Essential Components of ERS

High Quality Resources. Teachers perceived the need for high-quality resources as an essential component of the ERS. First, they mentioned that as many resources as possible that can be utilized in lessons should be included. Teachers expressed the need for motivational resources that can stimulate students' motivation, resources based on achievement standards, and student evaluation resources. Furthermore,

Table 5
Components of research findings

Main Category	Subcategory	Meaning Units (Frequency)
Essential Components	High Quality Resources	Diverse resources (7), Reprocessable resources (5), Timely resources (1)
	Convenient Features	Systematic resource classification (6), Searching function (6)
	Rewards for Resource Sharing	Monetary rewards (4), Teacher training opportunities (2)
Strategies to revitalize ERS	Improving Site Accessibility	Mobile-based service construction (1), Access rights granted to teachers only (4)
	Building User-friendly Features	Classification system construction (4), Enhancement of search functionality (6), Construction of interactive features (6), Development of resource recommendation feature (1)
	Increasing Awareness	Promotion through teacher teams (2)
	Establishing a Reward System	Production fee payment (5), Opportunities for training (4), Collaboration with textbook publishing companies (1)

teachers mentioned that various resources should be included for each subject. Particularly, middle and high school teachers, where lessons are conducted by subject, stated that not only specific subject resources should be intensively included, but all subject resources should be evenly incorporated. Resources that can be reprocessed also appeared as an essential component of the ERS that teachers perceive. Rather than utilizing the shared resources as they are, teachers prefer to reprocess the downloaded resources to suit their lessons and situations. Many teachers responded that they need open resources that are convenient to modify. In addition, teachers suggested the need for timely resources. Specifically, they stated the contents of the resources must appropriately reflect the information at the present time.

"The most important thing, I believe, is the diversity of resources in the

ERS… Initially, there needs to be accessibility to various resources. I think diversity is necessary."

"Currently, as you all mentioned earlier, there are hardly any teachers who use the resources as they are. In order to modify and use them to one's taste, there must be open resources available. Rather than resources that are perfectly structured from beginning to end, if the ERS were to host resources that can be more easily modified and changed, I believe teachers would be able to use them more comfortably."

Convenient Features. Teachers have mentioned that ERS must be equipped with features that are convenient for users. First and foremost, the majority of teachers perceived the need for a systematic resource classification function. Resources must be systematically categorized according to subject, grade level, publisher, achievement standards so that teachers can easily find the resources they want. There were also mentions that various resources, such as interdisciplinary resources and learning module-specific resources, must be classified in an easily viewable manner. The need for a search function in the ERS was also raised several times. Teachers perceived the need for features such as keyword search or tag search to easily access the desired resources. In order to reduce the time spent on resource searching and to easily find the resources they are looking for, there must be the ability to search using keywords.

"The classification system by grade and subject is in place, but there is no classification according to the teaching method. In my case, I wanted to find resources specifically for educational drama or remote learning, but such specific classifications were not available. To find the resources, I had to click on each one and actually view it, which took a lot of time. I had this experience, and I thought it might be a good idea to provide an interface that could further specify the teaching method and gather the corresponding resources."

> "These days, since the units are different in each textbook, it would be nice if there were distinctions by learning topics or such. I thought it would be helpful in searching if you could tag resources like tagging on SNS, and if you could find resources by those tags."

Rewards for Resource Sharing. Teachers emphasized that for effective sharing of resources, there must be rewards for sharing. First, the majority of teachers mentioned the need for 'monetary rewards' for sharing resources. Various forms of financial incentives such as research funds, manuscript fees, and resource creation fees can act as motivators for creating and sharing resources, making them essential components of the ERS. In addition to rewards, teachers also expressed the need for opportunities to provide 'teacher training,' which can lead to professional development. They perceived that offering training opportunities to teachers who consistently share high-quality resources is an essential element in building a virtuous cycle of resource sharing within the ERS.

> "Incentives are often mentioned. We can talk about many basic things, but in our administrative documents, we have manuscript fees. Based on this, I think we should at least provide manuscript fees on legal backgrounds. The resources teachers upload are abundant, but the manuscript fees we can provide are extremely limited – maximum to three pages of a word file or six PowerPoint slides. We can't give more (that exceed the maximum allowable amount for payment). But I think even that could be an incentive for good resource creation."

> "In fact, there are many well-known teachers who actively share resources, but I believe there are even more hidden experts. Therefore, when a resource is uploaded, considering the response to the resource and the teachers' comment feedback, I thought it would be good to also link it as an opportunity to open training opportunities for that teacher, creating a room for opportunities."

Strategies to revitalize ERS

Improving Site Accessibility. Teachers have expressed the need to improve the accessibility of ERS to enhance its operation. Specifically, they have reported significant inconvenience when accessing the ERS, primarily designed for Internet PC use, through mobile devices. They emphasized the need to build a mobile-based site, reflecting the increasing use of mobile devices such as smartphones and tablets. They also perceived a need for change in the way the site is accessed. The teachers felt uncomfortable with the access method that allows non-teachers to view resources in the ERS for teachers, and they believed that the excessive openness of the ERS could act as a hindrance to seamless resource sharing among teachers. They responded that the ERS should be a space exclusively for teachers to comfortably and freely share resources, and they suggested the need for restricted access rights, such as a teacher authentication system and NICE integration, so that only teachers can access it.

> "So far, there are many ERS mainly for Internet PCs, but I have the thought that it would be good to continue to develop a platform that can be easily accessed based on mobile."

> "Accessibility to share resources comfortably is important, and I also think that exclusivity is needed. ... If other people from outside can freely enter the community site, wouldn't teachers feel a bit reluctant to upload resources?"

Building User-friendly Features. Teachers have suggested several measures for the active operation of ERS. These include construction of 'classification system,' 'enhancement of search functionality,' 'construction of interactive features,' and 'development of resource recommendation features'. Teachers believed if ERS is equipped with user-friendly features, it will be more actively operated.

First, teachers responded that a classification system would allow them to quickly

find the resources they want. They believe that if resources are organized according to specific classification criteria, the ERS could attract more users. Similarly, for search functionality, teachers expect that if features are provided that allow easy searching by keywords or tags, the time spent on resource searches will be reduced. Teachers perceived that if there are convenient features to easily and quickly acquire the desired resources, the ERS will be actively operated.

> "Usually, when you go to places like Coupang that sell products, there are a tremendous number of branches that come with a single search word on such sites. So, I thought that if the platform used by teachers could also pull out various things with one word, teachers might be able to access it a little more easily."

Additionally, AI-based resource recommendation functions were suggested as operational activation measures. Some teachers expressed the opinion that if there is a feature that automatically recommends resources that teachers may be interested in by analyzing the characteristics of frequently used resources, many teachers will be drawn to the ERS.

The construction of interactive features was also suggested as an operational activation measure, with mentions of a teacher community space, a bulletin board to communicate with resource creators, comment windows. Beyond simply sharing and downloading resources, the need for interactive features that can create, share, and reprocess resources through active communication between teachers was emphasized.

> "If you look at the existing concepts like makerspaces or hackerspaces, they are developed by the community. In other words, it must be developed by the teachers who want it, and collaborative workspaces are essential ... Features like meeting functions or activities for forming learning communities, information exchange, must be structured."

Increasing Awareness. The opinion was presented that promotion is necessary for increasing awareness of ERS. Teachers mentioned 'Pilot team' as a means of promoting the ERS. Pilot team, suggested as an activation measure, is a group composed of teachers with excellent resource creation abilities, and it performs the role of producing, loading, and promoting exemplary resources that the users of the ERS need. Responses were reported that the resources created by the pilot team and the operating system of the ERS should be promoted to attract users to the ERS.

> "If it is to be in a form that can be actually utilized in class, I think the resources made by teachers who actually teach would be good. For that to exist, especially in the case of secondary education, it won't be enough to just advertise to various teachers at the beginning, and I think there needs to be some team operating and uploading quality resources, playing a bridging role."

Establishing a Reward System. Teachers stated that the establishment of a reward system for resource sharing is necessary for the activation of ERS. By providing rewards for resource sharing, existing resource sharers can be incentivized to continuously create and share resources, and new teachers can be attracted to resource sharing. Some teachers responded that payment for resource creation is necessary as a reward. They answered that incentives for resource creation should be provided under the name of research funds or creation fees. In addition to monetary rewards, there were opinions that opportunities for teacher training should be provided to resource sharers. Specifically, responses were presented that opportunities for teacher training related to resource creation should be provided to excellent resource providers, or opportunities to connect with publishers and other educational media-related companies should be provided.

> "A little bit in terms of cost, like research funds, well, this is inevitable, but if some benefits are given in that regard, I would like to share the data I created. ... (Then) Wouldn't the lacking parts (of resource sharing) become a

little richer?"

"Teachers have collaborated and a lot of resources have been created. There are a lot of educational products. But now, all of that was connected with on-site teachers, and those who diligently create resources, it shouldn't just end with sharing, but really good resources should be linked with such companies to have opportunities to design better or something."

Discussion and Conclusions

The study investigated the perceptions of primary and secondary teachers regarding educational resource sharing systems(ERS). ERS is an online system where teachers can freely search and download educational content and further share the educational content they have created with others. With the advancement of technology, various digital teaching and learning resources have emerged, and the importance of ERS is being emphasized. Furthermore, resource sharing is a factor that positively affects teacher professionalism, teacher efficacy, and student academic achievement. Therefore, there is a need to build a virtuous cycle of resource sharing through the activation of ERS operation. In this regard, this study selected teachers, the main users of ERS, as interview subjects and investigated the essential components of ERS perceived by teachers and measures to activate its operation. The conclusions and discussions on the research results are as follows.

First, the essential components of ERS were mentioned as high-quality resources, convenient features, and rewards for resource sharing. Teachers said that as many diverse resources as possible, such as teaching materials and evaluation materials, should be shared within ERS. Teachers also perceived that it is important for resources that can be reprocessed to be included, as they often have to modify shared resources to fit the lessons they have designed. Moreover, they mentioned that timely resources are needed since out-of-date resources are inappropriate to use in lessons.

This is consistent with previous research (Cho et al., 2013; Park & Moon, 2015), where the need for a large number of reusable and up-to-date resources was found. Next, teachers perceived the need for advanced search features such as keyword search to easily and quickly find the desired resources. Based on this, it was found that a systematic classification system, such as hierarchical classification and subject-based classification, is needed to conveniently access the desired resources. Furthermore, teachers mentioned that a kind of reward system is needed for resources to be shared. They pointed out the limitations of resource sharing behavior arising from teachers' volunteer spirit or sense of mission, and mentioned the need for rewards such as monetary compensation for resource sharing or opportunities for training for teachers. This suggests the need to establish a sustainable resource sharing system through extrinsic rewards for resource sharing. Through this study, it was found that high quality resources, convenient features, and functions for resource sharing are required as essential elements of ERS. This is consistent with the results of previous studies that investigated teachers' demands for ERS (Cho et al., 2013; Park & Moon, 2015), and suggests that these three elements are indispensable for the operation of ERS.

Second, teachers proposed improving site accessibility, building user-friendly features, increasing awareness, and establishing a reward system for resource sharing as strategies to revitalize ERS. In terms of site accessibility, opinions were presented that mobile-based services that can be accessed through mobile devices such as smartphones or tablets should be established. This is thought to be a suggested opinion because the work style has diversified from using a single device to using various devices such as mobile phones and tablets. This implies a need to improve the convenience of use by building mobile services and increase the willingness to use ERS. Also, teachers perceived that ERS should be operated as a space exclusively for teachers. This is in line with previous research (Park & Moon, 2015) that teachers prefer resources produced and shared by fellow teachers, indicating the need for ERS to be operated in a restricted access manner. Securing the exclusivity of ERS through

teacher certification systems and NICE-linked login might be a key. Next, teachers hoped for the construction of user-friendly features. Specifically, teachers mentioned that the resource classification system needs to be refined. They also suggested that search functions should be enhanced to allow searches by keywords or tags. In addition, opinions were presented that they would frequently use ERS if there were an AI-based resource recommendation system that provides similar resources to the ones they are looking for or resources that match their interests. The features mentioned above have the commonality that they can shorten the time spent on resource exploration. Based on this, it can be understood that teachers find a site attractive that can minimize lesson preparation time. This implies that there is a need to enhance features such as resource classification, search, and recommendation. Next, teachers mentioned that increasing awareness of ERS is needed. Specifically, opinions were presented that forming a pilot team to show the process of resource production, sharing, and reprocessing in advance can attract the non-users of ERS. This infers there is a need to promote by providing various ways to induce teachers' willingness to use ERS, rather than just simple promotion through official document dispatch. Lastly, it was found that a reward system for resource sharing must be established. Payment for resource creation, opportunities for training, and opportunities for collaboration with related companies were proposed as reward methods. This points to establishing an appropriate reward system.

This study explored the perception of primary and secondary teachers about ERS at a time when the use of digital educational resources has increased. Specifically, it explored the essential components and strategies to activate the operation of ERS, which functions as a place for resource sharing. Furthermore, by conducting interviews with teachers, who are the main users of ERS, it reflected the voices of the field and presented realistic measures for operation activation. Therefore, this study can provide a guideline for establishing strategies to strengthen related services for the activation of ERS for resource sharing.

However, this study has two limitations. First, only the perception of teachers was

investigated. Despite the fact that the perception of ERS administrators may differ, this was not considered. In subsequent research, there is a need to expand the research subjects to ERS administrators and explore various perspectives on measures to activate operations. Therefore, additional research has to be done to investigate the perceptions of various stakeholders related to ERS in order to establish a theoretical foundation for the advancement of ERS. Second, despite the fact that the operating entity of ERS varies in Korea, this was not considered. Distinguishing between the operating entities is required to gain a comprehensive understanding of how each operating entity manages ERS, as well as to differentiate teachers' perceptions among these entities. Therefore, further research is needed to explore teachers' perceptions and measures for active operation by distinguishing ERS based on its operating entity.

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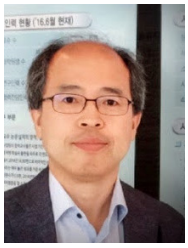

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