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The Analysis of the Purchasing Process and Distribution Management Requirements of Teaching Materials in Preschool

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Abstract

Purpose: This study is to analyze the purchasing process and distribution management requirements for teaching materials that have important meaning in the practical field of preschool education. **Research design, data and methodology:** A structured questionnaire was used to survey 103 childcare staffs regarding the purchasing process and distribution managements. The collected data underwent Likert's 5-point scale analysis and keyword grouping. Additionally, ANOVA was conducted to examine the distribution management demands based on demographic characteristics. **Results:** The purchasing of teaching materials involved more offline channels than online, and the purchase decisions were predominantly made by principals rather than teachers. Although the purchasing process is similar to that of general businesses, there are difficulties in purchasing due to the disorganized distribution channels and limited accessibility to product information. Additionally, the management of inventory for teaching materials is challenging due to limited personnel and storage. Childcare staffs have requirements for classification systems, evaluation criteria, environments and policies related to teaching materials distribution. The need to introduce a teaching material evaluation and certification system to ensure quality was not high. **Conclusions:** Most of the respondents recognized that strict management and measures should be taken for the distribution of teaching materials. There were differences in the demand of teaching material distribution depending on the respondents' status, age, education, and experience.

Keywords: Purchasing Process, Teaching Materials, Distribution Management, Preschool, Childcare Staffs

JEL Classification Codes : D30, D39, D80, I20, I21, I28

1. Introduction

Early childhood education and childcare in Korea was triggered by the expansion and application of free childcare policy in 2013. Since then, early childhood education has changed significantly in the direction of strengthening the public responsibility of the state and society for the

education and protection of children. The impact of these changes has also strongly influenced issues related to teaching materials, one of the important factors that determine the quality of early childhood education. In other words, early childhood education in practical education field faced criticism that it lacked efforts to manage distribution of teaching materials (Kim, 2014).

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Teaching materials collectively refer to various types of items, supplementary materials, and media used for learning focus on activities and is a medium for development activities and educational contents in preschools or childcare centers. In this study, "teaching materials" or "educational materials and equipment" are defined according to Kang and Park's (2014) criteria and refer to items such as those listed in Table 1. Equipment like blackboards, chairs, and desks are excluded from this definition. However, tablets and electronic devices that young children directly interact with are included in the definition. Toys are mainly used at home, while teaching materials are used in early childhood education institutions. However, toys can also be included as part of teaching materials. For example, pretend play toys are used in both homes and preschools. On the other hand, while colored paper is considered a teaching material in preschools, it is not classified as a toy.

Table 1: Teaching Materials for children

| Features | Examples |
|--|---|
| Teaching specific skills and concepts | Number cards, Letter boards |
| Intrinsic motivational materials | Wood, Sand, Clay Paint, Colored paper |
| Components used in various ways | Blocks, Puzzles Lego |
| Miniature replicas and pretend play toys | Pretend play sets, Doctor playsets |
| IT Technology Utilization materials | Electronic gaming devices with monitors, Tablet |

Unlike primary, middle, and high school education, early childhood education does not have standardized textbooks. Instead, the daily activities in preschools are carried out through children's play using teaching aids and materials provided by teachers. Therefore, due to the higher reliance on teaching aids and materials in early childhood education compared to primary and secondary education, it is necessary to understand how the distribution and management of educational materials and equipment for early childhood education are being conducted and identify any existing problems.

As such, in the aspect of education of infants and young children, the importance of teaching materials has been emphasized as they are directly and closely related to educational effects. However, standards related to the production and distribution of teaching materials for infants and young children are not strict, and even standardized guidelines or standards to manage the quality of teaching materials are not firmly established (Kim, 2015).

According to the Bond and Smith (2010) s' research, the problems in the distribution of instructional materials include timeliness (delayed purchases), inventory waste,

unfulfilled teacher requirements, validity, accuracy, and more. To increase the efficiency of the instructional material distribution system, the authors suggest reflecting the needs of educational institutions in data collection related to instructional materials, building an online management system using IT technology to enhance teacher accessibility, and conducting continuous evaluation and improvement.

As the distribution environment of teaching materials is so poor this, teachers spend a lot of time making teaching materials and teaching supplementary materials in the field of early childhood education. Accordingly, the original activity of education and protection of infants and young children is hindered. As a result, the process of producing teaching materials lacking systematic and meticulous planning is producing various inefficiencies (Kim & Jung, 2018). Above all, it is impossible to directly produce all necessary teaching materials in childcare institutions (Choi, 2015).

The decision-making process for purchasing Teaching materials differs between public and private kindergartens. In public kindergartens, the decision is often made by individual teachers or through teacher collaboration, while in private kindergartens, it is made by the principal or through collaboration between the principal and teachers. The study found that the main issues when purchasing Teaching materials were the lack of suitable materials that fit the educational content and the high cost of materials (Kim & Park, 2015).

NAEYC and Fred Rogers Center (2012) noted that the use of technology in purchasing teaching materials is increasing. However, since many teachers have not personally experienced using such materials, online sellers should provide detailed product information, and early childhood programs need to provide teacher training on interactive technology. Additionally, NAEYC (2015) introduced considerations for purchasing materials for infants, prioritizing developmental appropriateness. Since young children cannot provide product reviews or make purchases themselves, teachers' opinions based on observations should be considered in the purchasing process. UNESCO IIEP (2018) presented considerations for the development, procurement, distribution, and storage of educational materials, emphasizing that although online purchasing is on the rise, careful physical examination and teacher reviews should be incorporated into the distribution process due to the direct use of materials by young children.

Therefore, in order to solve these problems, standards related to teaching materials must be prepared urgently. Along with this, high-quality teaching materials suitable for the developmental level of infants and young children, capable of arousing interest, and made by early childhood teachers should be distributed. In addition, all teaching and supplementary materials in circulation should be

commercialized with a solid yet sophisticated design to arouse the interest of infants and young children.

Teaching materials distributed in Korea are very diverse, including domestic brand products produced in Korea, foreign brand imported products, and overseas OEM products. All these teaching materials have similar functions, but they vary in price, design, material, and finish, so thorns may be exposed or harmful substances such as lead may be present. The distribution methods of teaching materials are very diverse, such as wholesale and retail agencies, Internet online, door-to-door sales, bulk purchases of packages when opening institutions, dumping sales from bankrupt companies, second-hand marketplaces, and overseas direct purchases. Therefore, users of teaching materials are very confused about which route to purchase to properly consume them.

In the corona era, as indoor activity time increased at kindergartens, childcare centers, and homes, sales of teaching materials appeared to have increased rather than before corona (Lee et al., 2021).

To ensure efficient distribution of educational materials and equipment for early childhood education, it is crucial to adequately consider the needs and demands of the education professionals who utilize them in the field. The findings of this study, which investigates the problems and requirements regarding the distribution of educational materials and equipment for early childhood education, will serve as a foundation for introducing an evaluation and certification system for teaching aids and materials, as well as enhancing distribution activities.

This study has a differentiated meaning in that it directly obtained the initial information related to the distribution of teaching materials targeting people working in childcare institutions. In the meantime, studies on educational materials related to childcare institutions have only made a theoretical argument from the legitimate point of view of management, but have not been sufficient to explain the basis for distribution management. In particular, confirming the practical level of awareness of the evaluation and certification system, which will be the most important policy mechanism for the distribution of teaching materials, can be said to be an innovative attempt as an activity to produce important data that will be directly related to the performance of the evaluation and certification system in the future.

2. Research Design

2.1. Measuring Tools

The research problem and questionnaire content of this study are as follows:

1. Purchasers and purchasing channels of teaching materials
2. Purchasing process for teaching materials
3. Problems in the distribution management of teaching materials
4. Requirements for distribution management of teaching materials

For Questions 1 was designed for single-choice responses from the given options. For Question 2, it was in the form of open-ended responses, and a sample response was provided. The responses from the participants were analyzed, focusing on keywords, and grouped accordingly. Question 3 required participants to select 2 answers from the given options without ranking them. Question 4 is structured using a 5-point Likert scale. The classification system for teaching materials in question 4 is based on Kang and Park (2014) as presented in Table 1, and the evaluation criteria are adapted from their classification. The distribution environment is based on the study by Kim and Go (2015).

1) Evaluation Criteria for teaching materials:

- Child's developmental level, educational value, durability, safety, creativity and expandability, stimulation of interest and curiosity in children, design elements such as beauty and aesthetics.

2) Distribution Environment and Policies for teaching materials:

- Institutional management related to the quality of educational materials and equipment.
- Distribution of commercialized materials to replace teacher-made educational materials and equipment.
- Policies regarding the educational materials and equipment industry, management of distribution data, and improvement of distribution structure.
- Utilization of environmentally friendly and sustainable materials, expansion of multimedia educational materials and equipment.
- Introduction of an evaluation and certification system to ensure quality assurance.

2.2. Analysis Subject and Method

In Korea, data collection for analysis was conducted targeting childcare teachers, assistant principals, and principals working at 18 preschools and childcare centers in the metropolitan area, including Seoul. Respondents were notified of the purpose of the survey and compliance with confidentiality through meetings, phone calls, and DMs in advance, and their permission was obtained. The survey collected data from December 1 to December 15, 2022 by

sending a Google Drive URL containing a self-response structured questionnaire on a five-point Likert scale. In fact, the URL for the survey was sent to 150 people, but all responses that did not respond or were insincere in various forms were excluded and a total of 103 responses were used for analysis.

Table 2: Reliability Analysis Result of Survey Questions

| Classification | Cronbach's α |
|--------------------------------------|---------------------|
| Need of Taxonomy | .865 |
| Evaluation criteria | .863 |
| Environment & Policy on Distribution | .865 |

Table 3: Results of calculating commonality index of survey questions

| Classification | Factor loadings |
|---|-----------------|
| Need of Taxonomy 01 | .723 |
| Need of Taxonomy 02 | .839 |
| Need of Taxonomy 03 | .896 |
| Need of Taxonomy 04 | .900 |
| Need of Taxonomy 05 | .805 |
| Evaluation criteria 01 | .649 |
| Evaluation criteria 02 | .676 |
| Evaluation criteria 03 | .720 |
| Evaluation criteria 04 | .568 |
| Evaluation criteria 05 | .726 |
| Evaluation criteria 06 | .681 |
| Evaluation criteria 07 | .723 |
| Environment & Policy on Distribution 01 | .731 |
| Environment & Policy on Distribution 02 | .843 |
| Environment & Policy on Distribution 03 | .618 |
| Environment & Policy on Distribution 04 | .658 |
| Environment & Policy on Distribution 05 | .757 |
| Environment & Policy on Distribution 06 | .773 |
| Environment & Policy on Distribution 07 | .796 |
| Environment & Policy on Distribution 08 | .682 |

Reliability analysis for calculating Cronbach's α coefficient, principal component analysis extraction method, and factor analysis using varimax rotation method were applied on the response items to increase precision as a scale. As a result of the reliability analysis, Cronbach's α coefficient was recognized as 0.865 for the classification system of teaching materials, 0.863 for the evaluation

criteria of teaching materials, and 0.865 for the perception of the environment and policy of teaching materials, and very high reliability was confirmed. Subsequently, factor analysis was conducted on all questions without excluding specific questions. Considering that the variables adopted in this study are measures whose validity has already been verified through previous studies, only the factor loading based on the commonality index was confirmed. These criteria accepted the scientific verification result (Shin & Han, 2012) that factors with factor loadings of 0.500 or higher can be used for analysis. Through factor analysis, it was confirmed that the factor loadings of all questions exceeded 0.500, so the following analysis process was carried out without taking any additional measures.

For the analysis of the collected data, Questions 1 and 3 were subjected to frequency analysis, and Question 2 underwent keyword grouping. Question 4 involved the use of PASW Statistics 18, MS Excel, and other tools to calculate demographic characteristics and descriptive statistics of the respondents. Additionally, differences in means for demographic characteristics were tested using one-way analysis of variance (ANOVA). Based on these statistically validated results, significant insights were derived.

3. Research Results and Discussion

Table 4 shows the demographic characteristics of childcare teachers, assistant principals, and principals who responded to the survey. All respondents were female. According to the "Childcare Statistics" published by the South Korean Ministry of Health and Welfare, as of December 2022, the total number of preschool teachers in South Korea was 311,996, and among them, there were 10,502 male teachers, accounting for 0.3% of the total childcare teachers. Therefore, the fact that all research participants were female is consistent with the actual situation. As for the age group of respondents, 30 people (29.1%) were in their 30s between the ages of 30 and 39, and the highest level of education was 45 people (43.7%) who graduated from a junior college. 28 people (27.2%) had more than 15 years of teaching experience, and 33 people (32.0%) received monthly wages of 2 million Korean Won (KRW) or more and less than 2.5 million won. As for working hours, 8-hour workers (50 people, 48.5%) were identified as the most.

Table 4: General Characteristics of Survey Subjects

(N=103)

| Classification | | Number | Percentage (%) |
|----------------------------------|---|--------|----------------|
| Gender | Male | 0 | 0 |
| | Female | 103 | 100 |
| Position | Principals | 18 | 17.5 |
| | Assistant principals | 8 | 7.8 |
| | Teachers | 77 | 74.8 |
| Age | Over 20 and under 29 | 18 | 17.5 |
| | Over 30 and under 39 | 30 | 29.1 |
| | Over 40 and under 49 | 28 | 27.2 |
| | Over 50 | 27 | 26.2 |
| Education | High school or less | 1 | 1.0 |
| | Junior college | 45 | 43.7 |
| | University | 34 | 33.0 |
| | Graduate school or higher | 23 | 22.3 |
| Education Career Period | Less than 1 year | 7 | 6.8 |
| | More than 1 year and less than 5 years | 17 | 16.5 |
| | More than 5 years and less than 10 years | 25 | 24.3 |
| | More than 10 years and less than 15 years | 26 | 25.2 |
| | More than 15 years | 28 | 27.2 |
| Salary / Month (Korean Won, KRW) | Less than 1 million won | 5 | 4.9 |
| | More than 1 million and less than 1.5 million | 11 | 10.7 |
| | More than 1.5 million and less than 2 million | 11 | 10.7 |
| | More than 2 million and less than 2.5 million | 33 | 32.0 |
| | More than 2.5 million and less than 3 million | 15 | 14.6 |
| | 3 million or more | 28 | 27.2 |
| Working hours / week | 4 hours, part time | 16 | 15.5 |
| | 8 hours | 50 | 48.5 |
| | More than 8 hours | 37 | 35.9 |

3.1. Purchasers and Purchase Channels of Teaching Materials

Based on the findings of the question regarding who makes the purchasing decisions for educational materials, Figure 1 illustrates that principals (56%) have more decision-making authority than teachers (44%). Despite teachers being the direct users of educational materials, it is noteworthy that principals are involved in almost half of the purchasing decisions. This can be attributed to principals also being responsible for managing supplies, facilities, and budgets, in addition to educational materials and equipment. In other words, although teachers recognize and request the need for educational materials and equipment, the final purchasing decisions are made by principals. Consequently, there are cases where teachers' purchase requests are not met, leading to instances where teachers have to make materials themselves. This aligns with previous studies that indicate that, unlike in primary and secondary education, early childhood education often involves teachers making

educational materials themselves, leading to a perceived burden among early childhood teachers. The results are consistent with the research by NAEYC and Fred Rogers Center (2012), NAEYC (2015), and UNESCO IIEP(2018).

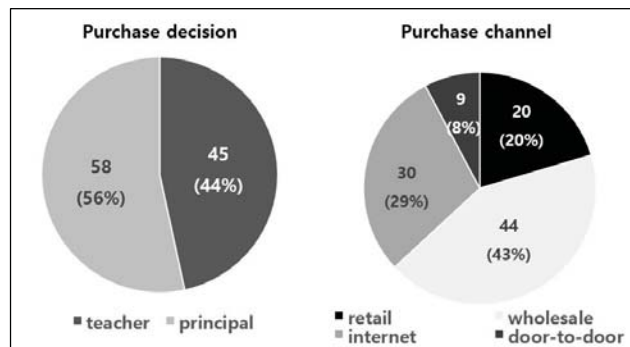


Figure 1: Purchaser & Purchase Channel (N, %)

Most purchases for educational materials were made through wholesale stores (43%), followed by online

shopping (29%), retail stores (20%), and approximately 8% through sales representatives who visited institutions with samples and catalogs. Despite the current popularity of online shopping among the general public, it is noteworthy that when it comes to early childhood education materials, there is a preference for physically examining and purchasing the items (71%).

3.2. Purchasing Process for Teaching Materials

After providing an example of the purchasing process (identifying necessary items, ordering, receiving goods), respondents were asked to describe the specific purchasing process of educational materials and supplies for the childcare center. The results of analyzing respondents' free-form sentences by keyword-centered analysis and grouping similar responses are as follows.

Looking at this purchasing process, we can observe that the procurement of goods in preschool is similar to that of regular businesses in terms of stages. Despite being small-scale establishments with mostly less than 10 staff members, the purchasing process itself is not haphazard.

Table 5: Purchasing Process (sample size=103)

| Step | Purchasing Process (by keyword grouping analysis) | N | % |
|------|--|-----|------|
| 1 | Identification of Requirements | 103 | 100 |
| 2 | Assessment of Inventory and Required Quantities | 95 | 92.2 |
| 3 | Gathering Distribution Information | 55 | 53.5 |
| 4 | Requesting Samples | 46 | 44.7 |
| 5 | Ordering, Receipt, and Inspection | 103 | 100 |
| 6 | Utilization by Classrooms & Teachers | 101 | 98.5 |
| 7 | Product Evaluation | 70 | 67.8 |

In terms of response rates, there were cases where the third stage, which involves gathering purchase information, the fourth stage, which includes sample requests and analysis, and the seventh stage, which involves product evaluation, were omitted. This may be due to the fact that the provided examples in the questionnaire were condensed into three stages.

Many respondents reported the omission of the step 3, "Gathering Distribution Information," which is consistent with the next issues raised in the research question. This indicates the difficulty in obtaining accurate information about the price, purchasing channels, and product reviews of educational materials.

Regarding the omission of the step 4 "Requesting Samples", in small-scale preschool, it may be practically difficult to request samples for small quantity purchases. This is also one of the reasons why there is a higher preference for direct physical inspection before making a

purchase (71%) compared to online shopping (29%).

Additionally, the phenomenon of omitting the final step 7, "Product Evaluation," suggests that although teachers, as consumers, may provide reviews based on their direct usage of the materials, these reviews may not reach the decision-makers, such as the preschool principal. This highlights a lack of communication and information sharing among members involved in the purchasing process, despite the relatively small size of the preschool staff.

3.3. Problems in the Distribution Management of Teaching Materials

Based on previous research on the distribution of teaching materials and equipment, various issues were identified, and respondents were asked to select two without ranking them. They were also asked to provide specific examples related to the selected issues. Out of 103 participants, only 13 described the specific case, and there were a total of 20 cases. The results are as follows.

Table 6: Distribution Problems (number of responses=206)

| Distribution Problems | N | % |
|------------------------------------|----|------|
| Confusion in distribution channels | 26 | 12.6 |
| Price discrepancies | 38 | 18.4 |
| Errors in online purchases | 42 | 20.4 |
| Lack of distribution information | 44 | 21.4 |
| Challenges in inventory management | 56 | 27.2 |

3.3.1. Confusion in distribution channels

There is confusion due to the variety of distribution channels, making it uncertain where and what to purchase for the most desirable outcome. Sometimes, unknowingly, products from unreliable suppliers are sold at discounted.

3.3.2. Price discrepancies

There are significant price differences for the same functionality, with varying prices across different brands and even different sellers for the same product. This requires thorough market research before making a purchase, which can be time-consuming.

3.3.3. Pitfalls of online purchases

The increase in online purchases through the internet and mobile platforms brings challenges. Products received may differ from what was presented on the website, with inadequate product descriptions. There are also cases of misleading product reviews and difficulties in communication with sellers for returns or exchanges.

3.3.4. Lack of distribution information

It is challenging to access comprehensive information

about suitable teaching materials, including details about manufacturers, sellers, and specific product information such as age appropriateness, utilization methods, and educational value. The results are consistent with the research by NAEYC (2012, 2015).

3.3.5. Difficulties in inventory management

Due to a lack of dedicated personnel for purchasing and maintaining teaching materials, individual classroom teachers end up managing their own supplies, resulting in overall difficulty in inventory control. It becomes challenging to track stock quantities and locate items within the facility. Additionally, there is a lack of maintenance management in case of product defects. Implementing barcode systems for tracking and addressing storage limitations are necessary. The results are consistent with the research by UNESCO IIEP (2018), and it is necessary to implement a barcode system or artificial intelligence to overcome the limitations of inventory management and storage space.

3.4. Results of Descriptive Statistics Analysis by Variable

Table 7 shows the descriptive statistics for each area regarding the demand of childcare teachers, assistant principals and principals for teaching materials distribution.

As can be seen from the contents of the Table 7, childcare staffs demanded for classification system (3.95), evaluation criteria (4.37), and environment and policy (4.15) regarding teaching materials distribution. Of course, the demand of the classification system is rather low among the three, but since all three areas are at a high level at an absolute level, it is not particularly meaningful to distinguish superiority or inferiority among them.

Table 7: Statistical Analysis Results on Demands Related to Teaching Materials Distribution

| Areas and detailed indicators | | Mean (S.D.) |
|-------------------------------|--|-------------|
| Need by Classification System | Teaching specific skills and concepts | 4.04(.816) |
| | Intrinsic motivational materials | 4.02(.840) |
| | Components used in various ways | 3.91(.876) |
| | Miniature replicas and pretend play toys | 3.91(.991) |
| | IT Technology Utilization materials | 3.86(.875) |
| | Average | 3.95 |
| Evaluation Criteria | Developmental appropriateness | 4.31(.657) |
| | Educational value | 4.30(.672) |
| | Durability | 4.43(.666) |
| | Safety | 4.75(.499) |
| | Creativity and extensibility | 4.27(.629) |
| | Children's interest and curiosity | 4.44(.699) |
| | Aesthetics, design elements | 4.09(.768) |
| | Average | 4.37 |

| Areas and detailed indicators | | Mean (S.D.) |
|---|--|-------------|
| Environment & Policy about Distribution | National quality management | 4.17(.772) |
| | Distribution of of alternative products for handmade items | 4.27(.677) |
| | Government measures for related industries | 4.27(.660) |
| | Distribution Data management | 4.22(.609) |
| | Improvement of distribution system | 4.02(.771) |
| | Eco-friendly and sustainable materials | 4.43(.589) |
| | Multimedia utilization | 4.09(.781) |
| | Evaluation certification system | 3.76(.910) |
| Average | 4.15 | |

Looking in detail, first of all, among the demands of childcare teachers, assistant principals and principals regarding the teaching materials classification system, the demand that a classification system of instructional materials to teach specific skills and concepts is necessary and subdivided (4.04) was identified as the highest. On the other hand, the demand (3.86) that a classification system of teaching materials using IT technology was confirmed relatively low. Since this number is high in absolute terms, it is difficult to regard the gap between the two demands as a clear difference, but childcare staffs generally tend to value learning. Since they are immature infants and young children, the use of IT devices can be seen as moderation or avoidance.

Next, among the demand of childcare staffs regarding the evaluation criteria for teaching materials, the perception that safety should be included in the evaluation criteria for teaching materials (4.75) was identified the highest. On the other hand, the demand that beauty, aesthetic sense, and design elements should be included in the evaluation criteria for teaching materials (4.09) was confirmed to be relatively low. Although demand of safety is overwhelmingly high, it is difficult to see that the gap in the difference is meaningful, as in the case of the classification system. However, it can be judged that most of the childcare staffs consider the safety of infants as the most important thing when using teaching materials and place more importance on functional elements than aesthetic and design elements of teaching materials.

Finally, among the demands of childcare staffs regarding the distribution environment and policies, the demand that eco-friendly and sustainable teaching materials should be expanded (4.43) was the highest. On the other hand, the demand (3.75) that an evaluation and certification system should be introduced to ensure quality was confirmed relatively low. Early childhood teachers, assistant principals and principals most prefer harmless teaching materials for infants and young children that can be used continuously, but they seem relatively unwilling to introduce a system for evaluation and certification of teaching materials managed by the state.

Here, it is noteworthy that the teaching materials evaluation and certification system is passive about the introduction, even though it has nothing to do with the duties of childcare teachers, assistant principals, and principals. Studies by Kim and Lee (2014), Kim (2014), Kim and Go (2015), and Choi (2015) emphasized the effectiveness of the teaching materials evaluation and certification system.

However, it was confirmed that childcare teachers, assistant principals, and principals in the field do not have absolute trust in the evaluation and certification system. This passive attitude is presumed to be due to the burden that the teaching materials evaluation and certification system will cause an increase in the management work of childcare teachers, but it cannot be objectively determined.

3.5. Result of One-way ANOVA to Determine the Mean Difference according to Demographic Characteristics

In more detail, a one-way analysis of variance was applied to examine the difference in demands of the educational materials for early childhood according to the demographic characteristics of childcare teachers, assistant principals and principals. The research analysis results are shown in Table 8. In the analysis results, the cases in which the average difference was confirmed at a statistically significant level are as follows. The first is the demand of teachers on the classification system of teaching materials according to the final level of education. The second is the demand of the evaluation standards for teaching materials according to position, age group, final level of education, and teacher experience. The third was the demand of the teaching materials environment and policies according to age group.

The studies by Lee and Kim (2015), and Kim and Kim (2017), which demonstrated that women's perceptions can vary according to educational background, and Kim and Park (2017), which confirmed that women's perceptions can vary according to age, numerous studies have reported that there may be differences in women's perceptions according to the highest level of education or age. Therefore, it cannot be said that the results of this study, which confirmed differences in perception according to the final education level and age group in a group of childcare teachers consisting only of women, are different from previous studies. It was confirmed that the recognition of the evaluation criteria by age group was between the 20s and

40s, and the difference between the 20s and the 50s or older was the largest for the perception of the environment and policies. It can be assumed that this difference is due to the fact that young people are relatively less sensitive to institutional aspects. Considering that the level of vaccination among young people was the lowest despite institutional control in the actual situation of the Corona19 epidemic, it is not an unfamiliar result that awareness related to the system is lower than that of the older age group. It was confirmed that the recognition of the classification system according to academic background was between junior college graduates and college graduates, and the recognition of evaluation criteria was the largest between junior college graduates and graduate graduates. Presumably, considering that there is no difference from other academic backgrounds in terms of environmental and policy perceptions that can be seen from a macroscopic perspective, junior college graduates are considered to be relatively less interested in details in practical aspects such as classification systems and evaluation standards. However, since the difference between each group is not large enough to be seen as an obvious difference, and it is a difference in a situation in which all of them are at a high level, a detailed judgment on this requires a separate study. Moreover, a structured follow-up study is needed to clarify why there is a difference according to age only in the areas of evaluation criteria, environment and policy, and differences according to the final level of education in the areas of classification system and evaluation criteria.

In addition, it is consistent that average differences in evaluation criteria according to position and teacher experience are shown. In other words, the longer the teaching experience, the higher the probability of becoming a principal or principal. However, in terms of position, the level of awareness was the highest in the middle stage, but in terms of teaching experience, it was confirmed that the level of teachers with more than 10 years of experience was relatively higher than those with 1 to less than 10 years of experience. This is presumed to be because, in the case of assistant principal, as a middle manager, it is a position that puts more weight on management than teachers who directly use teaching materials. As the principal is the final decision maker, it is judged that the figure may be slightly lower than that of the assistant principal or teacher, considering the teaching materials from a more macroscopic perspective. In addition, the longer the experience, the higher the level of demand of the evaluation criteria for teaching materials is confirmed.

Table 8: Result of One-way ANOVA to Confirm Average Difference in Each Demands Area

| Classification | | Classification System | | | Evaluation Criteria | | | Environment and Policy | | |
|--------------------|--|-----------------------|------|---------|---------------------|------|---------|------------------------|------|-------|
| | | Mean | S.D | p | Mean | S.D | p | Mean | S.D | p |
| Position | Principals | 3.98 | .641 | .518 | 4.27 | .499 | .001** | 4.13 | .546 | .751 |
| | Assistant principals | 3.68 | .957 | | 4.80 | .152 | | 4.16 | .582 | |
| | Teachers | 3.94 | .840 | | 4.60 | .337 | | 4.24 | .571 | |
| Age | Over 20 and under 29 | 3.80 | .654 | .631 | 3.95 | .485 | .000*** | 3.97 | .653 | .013* |
| | Over 30 and under 39 | 3.93 | .640 | | 4.32 | .342 | | 4.00 | .450 | |
| | Over 40 and under 49 | 3.94 | .764 | | 4.56 | .511 | | 4.21 | .544 | |
| | Over 50 | 4.08 | .710 | | 4.52 | .440 | | 4.40 | .500 | |
| Education | High school or less | 3.80 | - | .000*** | 4.43 | - | .000*** | 4.38 | - | .374 |
| | Junior college | 3.72 | .608 | | 4.14 | .514 | | 4.08 | .545 | |
| | University | 4.36 | .531 | | 4.52 | .415 | | 4.28 | .572 | |
| | Graduate school or higher | 3.79 | .879 | | 4.60 | .336 | | 4.10 | .519 | |
| Career | Less than 1 year | 4.37 | .594 | .089 | 4.30 | .672 | .022* | 4.39 | .671 | .486 |
| | More than 1 year, less than 5 years | 3.80 | .682 | | 4.13 | .584 | | 4.05 | .685 | |
| | More than 5 years, less than 10 years | 4.20 | .614 | | 4.32 | .513 | | 4.18 | .500 | |
| | More than 10 years, less than 15 years | 3.84 | .718 | | 4.33 | .378 | | 4.05 | .510 | |
| | More than 15 years | 3.81 | .768 | | 4.61 | .364 | | 4.23 | .509 | |
| Salary/month | Less than 1 million | 4.28 | .701 | .054 | 4.17 | .889 | .042 | 4.38 | .625 | .640 |
| | More than 1 million, less than 1.5 million | 3.82 | .792 | | 4.22 | .566 | | 3.92 | .568 | |
| | More than 1.5 million, less than 2 million | 4.09 | .362 | | 4.17 | .270 | | 4.20 | .555 | |
| | More than 2 million, less than 2.5 million | 4.18 | .584 | | 4.33 | .539 | | 4.11 | .597 | |
| | More than 2.5 million, less than 3 million | 3.57 | .590 | | 4.32 | .384 | | 4.22 | .413 | |
| | 3 million or more | 3.81 | .876 | | 4.62 | .341 | | 4.20 | .546 | |
| Working hours/week | 4 hours, part time | 3.96 | .774 | .368 | 4.21 | .651 | .330 | 4.06 | .606 | .639 |
| | 8 hours | 4.04 | .533 | | 4.39 | .443 | | 4.14 | .567 | |
| | More than 8 hours | 3.82 | .874 | | 4.42 | .464 | | 4.21 | .506 | |

* $p < .05$, ** $p < .01$, *** Significant at $p < .001$

4. Conclusions

The purpose of this study was to analyze the purchasing process and distribution management demands of educational materials in early childhood education settings. By doing so, the study aimed to gather fundamental information necessary for efficient distribution management of educational materials. Based on the results of this study, the following discussions can be made.

First, it was evident that the purchasing decisions for teaching materials in early childhood education settings were primarily made by the principals. However, to ensure that the opinions and usage reviews of the teachers, who directly use these materials, are considered, it is essential to activate teacher meetings or internal communication networks within the institution. This will facilitate effective communication and collaboration between decision-makers and teachers, leading to a more inclusive and well-informed purchasing process.

While modern society has embraced online shopping as a prevalent practice, it was observed that the use of internet

purchasing in the early childhood education field remains limited. To promote the activation of online purchases in early childhood education settings and alleviate the workload of the staff, reliable product information, transparent transaction procedures, and guaranteed after-sales support must be provided. Ensuring trust and convenience in online purchasing will encourage teachers and staff to adopt this method, leading to a more efficient and streamlined procurement process.

Second, the teaching materials in preschools lack standardization in production criteria and distribution channels. The accessibility of product information is also limited, making it difficult for preschools to make purchases. This is because preschool education services are not mandatory education as determined by the government. However, in Korea, where there is a severe low birth rate phenomenon, promoting public childcare and education has become a national survival strategy. Therefore, the management of teaching materials for early childhood education should also be regulated at the national level. While respondents acknowledged the need for an evaluation

and certification system for the distribution of teaching materials, they scored this item lower compared to others. The analysis suggests that this is due to concerns that the implementation of such a system may increase teachers' workload and lead to price hikes. While the importance of verified distribution of teaching materials is recognized, it is essential to consider the voices from the field when introducing the certification system to address potential side effects.

Third, the purchasing process of educational materials in preschool settings is similar to that of regular businesses. However, it has been found that there are significant challenges in inventory management. This aligns with the findings of Kim (2015), who advocated for the allocation of part-time personnel for the production and procurement of educational materials, purchase consulting services, and the provision of sufficient storage space for effective inventory management.

Fourth, the production companies of teaching materials should consider the various criteria required by childcare educators, as indicated in this study. Childcare educators prefer teaching materials that are aligned with the fundamentals of education, safe, and environmentally friendly, rather than those with fancy designs or advanced IT technologies. This finding is also supported by research conducted by Melissa et al. (2022), which emphasizes the prioritization of basic criteria such as age-appropriateness in the distribution of teaching materials.

In conclusion, South Korea is facing a population cliff due to the phenomenon of ultra-low birth rates, making the improvement of the public childcare environment crucial. To address the distribution management issues identified in this study regarding educational materials and supplies in early childhood education settings, we propose the implementation of a national government-led artificial intelligence system. Up until now, issues have arisen due to teachers or directors manually managing teaching materials. However, the adoption of an artificial intelligence system, based on deep learning, can address these issues. By incorporating AI into the purchasing and inventory management processes of desired teaching materials in childcare facilities, significant time and effort can be saved.

5. Limitations of the Research

Although this study created basic information through a scientific analysis process, it has the following limitations. Since data collection for analysis was limited to childcare teachers, assistant principals, and principals of national and public childcare centers located in the metropolitan area, care must be taken when applying to the whole society or nationally. In addition, the survey results of this study are

the initial information on childcare teachers related to the distribution of teaching materials for early childhood education. Therefore, the possibility of errors always exists, and it is inevitable that more verification process is still required. In addition, since critical analysis has not been sufficiently conducted due to the lack of preceding studies on the design structure of this study, it is urgently required to accumulate information and improve errors through follow-up studies sooner or later.

Finally, in this study, differences in the demands for the distribution management of teaching materials were observed among childcare educators based on their demographic characteristics. Therefore, it is recommended that future research should investigate these factors and incorporate them into the production and distribution of educational materials. Additionally, further research on establishing a national management system for early childhood education materials and exploring the potential applications of big data and AI is also necessary.

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