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컴퓨터 기반 그림 및 언어 조합을 통한 다중 직무 탐구 학습 전략이 그룹홈 거주 지적장애인의 조리직무기술에 미치는 효과

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The Effects of Multiple Job Exploration Learning Strategies through Computer-based Pictures and Language Combinations on Cooking Job Skills of Adults with Intellectual Disabilities Living in Group Homes

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ABSTRACT

[Purpose] The purpose of this study was to verify the effect of multiple job exploration learning strategies through computer-based pictures and language combinations on cooking job skills of adults with ID living in group homes. **[Method]** The study participants consisted of three adults with ID who have been living in the group home for a year without employment. The experimental environment consisted of a learning room in the group home and a cooking room in the restaurant business. In the study design, multiple probe design across participants technique of a single subject study was used, and the experimental conditions consisted of four types: baseline, intervention, maintenance, and generalization. The intervention program composed of independent variables can be viewed as computer-based online contents, and includes a procedure for multiple exploration of the performance of cooking job skills by combining pictures and languages. The cooking job skills consisting of dependent variables is defined as the performance of cooking fish cake udon directly in the cooking room of a restaurant with fish cake udon as a menu, and it was also composed of a total of 10 sub-steps through task analysis. **[Results]** It was found that the three participants effectively acquired and generalized cooking job skills through intervention programs. **[Conclusion]** Through the above results, it was possible to conclude that the meaningful functional relationship between the independent variable and the dependent variable is valid.

Key Words : Multiple job exploration learning strategies, Group homes, Intellectual disabilities, Cooking job skills, Single subject research

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Ⅰ. Introduction

The most important quality indicator of life for adults with ID is whether they live independently. This is because if adults with ID cannot maintain independent life in the scene of life, they might not be fully included for practical social integration and will have no choice but to continue their isolated and dependent lives (Park, 2013). In this regard, educational programs and teaching and learning support that can support social integration for adults with ID staying in general families or group homes after the transition to adulthood should be considered important (Kim, 2020; Kim, Kim, & Kwon, 2021; Lee & Heo, 2017).

There are various examples of educational programs organized for social integration and independence of adults with ID (Choi & Han, 2015; Kim & Park, 2020; Son & Lee, 2018). In particular, educational programs for independent living of adults with ID have the characteristics of being developed and operated in connection with real-life scenes such as local communities (Gage, Cook, & Reichow, 2017; Ha & Choi, 2021). In addition, in the case of educational activities that focus on the field of job during the independent life of adults with ID, it is difficult to secure the effectiveness of intervention factors and procedures, including temporal and spatial burdens (Kim, 2017; Plucker & Makel, 2021). In other words, the priority is to provide interventional conditions for adults with ID to specifically recognize the scenes and job contents of local businesses, and it is not possible to teach adults with ID only in the form of direct promotion of experts (Hong & Lee, 2016; Kim & Do, 2014; Lee, Kim, & Jeong, 2021; Simons, 2014).

Until now, it has been shown that various intervention factors and effectiveness have been verified for job education activities of adults with ID in the field of education for ID (Hong, 2015; Kang & Shin, 2015; Lee & Kim, 2018). However, this trend does not appear to include intervention procedures and measures that can be verified as the level of effectiveness of actual employment linkage or take into account COVID-19, which acts as a major limiting factor in the current social situation. Based on Yeo's (2021) research point of view, it is recognized that job life interventions for adults with ID need to be repeatedly applied to verify their effectiveness, but it is also somewhat limited to accumulate effect categories only in terms of direct promotion of experts or intervention centered on local businesses. Therefore, procedures and methods need to be developed for adults

with ID to organize job intervention activities at the level of referring to local businesses, thereby efficiently establishing a context of integrated exchanges and composition between general families or group homes and local businesses.

Usually, computers can be considered as the basis for intervention tools for reference to local businesses in adults with ID (Cihak, Smith, Cornett, & Coleman, 2012; Kim & Jang, 2017). The above computer is also used as a smart device such as an iPad, but most of the computers are installed in general homes and group homes where adults with ID usually live, making it suitable for application as a major tool (Burton, Anderson, Prater, & Dyches, 2013). In addition, computers can be applied as an effective intervention tool because they are tools for daily life of adults with ID and the advantages that can be reflected in terms of preferred learning styles are enhanced (Axelrod, Bellini, & Markoff, 2014; Hwang & Choi, 2020). However, there are not many cases in which adults with ID can acquire professional and specific job skills through intervention tools such as computers (Lee, 2020). Usually, adults with ID often acquire functional skills necessary to perform daily or residential life on a computer, and even if applied to functional skills related to job life, cases are mainly viewed in connection with field-oriented direct promotion (Ahn & Lee, 2020; Kim & Kwon, 2021; Son & Lee, 2018). In summary, the arbitration procedure that allows adults with ID to specifically explore the scenes and job performance of community businesses through computers at group homes with family life contexts is not specialized.

The main basis for adults with ID to acquire job skills through computers is pictures and language. Of course, visual clues and self-checklists have been actively applied as evidence-based practices to reflect learners' job education in the existing field of ID education, but they mainly reflect static scenes or related contents. Accordingly, evidence-based practices such as visual clues and self-checklists were insufficient to provide the advantage that adults with ID could take the lead in acquiring various job skills and increase the effectiveness of learning awareness (Gast & Ledfold, 2014; Oh & Jeong, 2020). In other words, the cases and possibilities of adults with ID to effectively acquire job skills can be positively reviewed depending on how they utilize and structure the pictures and languages that describe and explain job skills through computers. Previous studies reflecting this perspective as a specific case study appear to have few existing studies. There is a need for a case study that can reasonably shift the aspect of perception that computers are tools used in the form of games for the purpose of

simple learning interest and motivation of learners with ID.

As described above, computers can specifically reflect "multi-job exploration learning strategies" as they become an instrumental basis for producing and organizing various perspectives and forms of content for adults with ID through pictures and languages (Ahn & Lee, 2020; Choi & Han, 2015; Kim, 2017; Kim & Park, 2020; Lee, 2020; Lee & Heo, 2017; Lee & Kim, 2018; Rowe & Test, 2010; Son & Lee, 2018; Westling, Fox, & Cater, 2015). Multiple job exploration learning strategies refer to procedures and methods in which adults with ID learn job skills selected as target behaviors with content from various perspectives and contexts. In other words, computers are more capable of combining pictures and languages than other intervention tools, providing adults with ID with the advantage of exploring various situations related to performance as well as job skills (Bellini & McConnell, 2010; Delano, 2007; Gast & Ledford, 2014; Kim, 2015; Kim & Park, 2018; Yeon & Lee, 2017). Accordingly, computers can enhance the advantage of promoting the generalization of job performance by exploring jobs through a combination of pictures and language. In order for adults with ID to acquire job skills, they must access various contexts of content, such as performing task analysis step-by-step performance of job tasks, self-imitations of misresponse, and checking keywords related to misresponse. In this regard, computers become a strategic basis for multiple exploration by integrating and unifying various contents (Kim, 2015; Van Laarhoven et al., 2009). Therefore, the multi-job exploration learning strategy referred to in this study does not mean the diversity of intervention tools, but refers to the procedure of approaching the contents composed of job skills as target behavior from various contexts and perspectives.

The scope of job skills that adults with ID can acquire varies relatively depending on the basis of intervention between pictures and language through computers, but cooking job skills can be considered as part of that. Until now, for those with ID, most of the cooking job skills has been intervention through direct promotion of field businesses, and has focused a lot on simple functions such as beverage making such as coffee shops (Kim, 2017; Lee & Kim, 2018; Park, Lee, & Park, 2015). Alternatively, it appears to be a cooking assistance skills. Accordingly, although it is a cooking job skills that abundantly includes scenes and contents that allow specific learning according to the structure and form of use of pictures and language, the scope of learning of adults with ID should not be overlooked. In fact, looking at the trend of job interest surveys of adults with ID, cooking jobs appear

to have preferential preferences, and the need to be actively applied from the perspective of job education or lifelong education is raised (Park et al., 2021; Song, Hwang, Park, Bae, & Park, 2018).

In summary, the purpose of this study was to investigate the effect of multiple job exploration learning strategies through computer-based pictures and language combinations on cooking job skills of adults with ID living in group homes. The resulting research problem consisted of two types. First, what is the effect of multiple job exploration learning strategies through computer-based pictures and language combinations on acquiring cooking job skills for adults with ID living in group homes? Second, what is the effect of multiple job exploration learning strategies through computer-based pictures and language combinations on the generalization of cooking job skills in adults with ID living in group homes? Finally, the intervention program and results of this study will be the basic data necessary to develop and apply job education and lifelong education programs for adults with ID. Furthermore, considering the current COVID-19 situation, it is judged that it can be used as an example that can provide a competitive foundation for adults with ID to develop from a level referring to local businesses to a field-oriented level.

Ⅱ. Method

1. Participants

The participants in this study are three adults with ID living in a group home installed in a welfare center for the disabled located in S city. Participants have been living in the group home for a year without employment after graduating from a special school, and are currently preparing for employment on a part-time basis. In this regard, the intervention program was developed by the social rehabilitation teacher of the group home where the participants lived, and the employment linkage process could be promoted through the cooperation of local restaurant businesses that signed a business agreement with the disabled welfare center to which the group home belongs. The basic information of the participants

is shown in <Table 1>.

<Table 1> Basic Information of Participants

Item	Participant A	Participant B	Participant C
Gender	Man	Woman	Man
Age	21	20	21
Disability type	ID (With cerebral palsy)	ID (With autism spectrum disorder)	ID (With cerebral palsy)
K-WISC-Ⅳ	53	56	60
KNISE-SAB	65	60	62

Note. Among the participants' basic information, K-WISC-IV and KNISE-SAB correspond to the results measured during the course of attending high school in special schools.

Participants appear to communicate relatively freely with others in their daily lives, and in some cases, misinterpret when others attempt conversations that contain difficult meanings. Distance movement or fine hand movement is also easy, and it does not frequently show problematic behavior that damages others during daily life. However, during the life of the group home, they sometimes show the behavior of relying on social rehabilitation teacher to clean their rooms, and they prefer to play games on the computer the most. This preference is a phenomenon commonly observed by the three participants. In addition, participants prefer learning activities within the group home through audio-visual media, and frequently search the Internet and watch YouTube on their smartphones.

Participants have no experience in acquiring job skills through computers and do not have prior experience in cooking job skills. Finally, the participants expressed their consent to participate in this study, and the parents of the participants also showed their consent. For reference, social rehabilitation teacher in the group home majored in special educational engineering while attending a master's course in the graduate school's special education department, so he has the ability to directly develop and guide intervention tools applied in this study.

2. Experimental Environment

The experimental environment of this study is classified into an intervention environment and an evaluation environment. The detailed description is as follows.

1) Learning Room in the Group Home for Intervention

The learning room in the group home was composed of an environment for participants' intervention, and computers and desks were provided. A total of five computers are installed, and accordingly, participants gathered together to receive intervention. It was used as it was without any separate environmental reconstruction.

2) Restaurant A's Cooking Room for Evaluation

The selected restaurant business has fish cake udon as its main menu, and performance evaluation was conducted through the job of participants cooking fish cake udon in the cooking room. The evaluation was conducted by using the cooking room used by employees as it is, and the cooking room is equipped with gas facilities, various tools, and ingredients for cooking fish cake udon.

3) Restaurant B's Cooking Room for Generalized Evaluation

Since the selected restaurant business has installed and operated its second store in other areas within the S city, a generalized evaluation was conducted in the cooking room of the second store on the performance of the participants' cooking job skills. The cooking room was used without reorganizing the environment.

3. Research Tool

The intervention tool developed in this study is a job exploration board through computer-based pictures and language combinations. The above intervention tool consisted of online content, and was applied in a way that participants clicked and utilized with a mouse according to the manual reflected in the content. The contents of the intervention tool were classified into several package dimensions so that participants could recognize various situations and contents related to the performance of cooking job skills. In other words, the contents were composed of

three dimensions: (1) completing the task analysis of cooking job skills, (2) correcting the incorrect response of cooking job skills, and (3) Self-reflection feedback of cooking job skills. In addition, the above three contents were sequentially applied to participants in an interconnected context.

<Figure 1> Sample of the Guide Scene for Performing the Task Analysis Step of Cooking Job Skills

Completing the task analysis step-by-step content of the cooking job technology applied as the first content is to complete the performance scene by selecting the corresponding pictures and language (modified word form) for each step. For example, if participants are performing a task of making fish cake skewers for fish cake udon, they complete the interpretation of the performance scene and content of the task by clicking the pictures and languages of “skew” and “various fish cakes”. In addition, participants watch the task’s completion video scene before accessing the task’s performance pictures and words. Examples related to this are shown in <Figure 1>, <Figure 2>, and <Figure 3>.

In connection with <Figure 2>, <Figure 3> presents samples used by participants in terms of language (modified words). However, in this study, the intervention tool was created by constructing virtual figures and environments through design, and basically, participants were able to acquire demonstrations of tasks by paying attention to the facilities, tools, and materials used. In addition, the process of

selecting some of the various pictures and words was premised on the participants' use of <Figure 2> and <Figure 3>, so the perspective of exploration, which is the basic constituent principle of the intervention program, was emphasized.

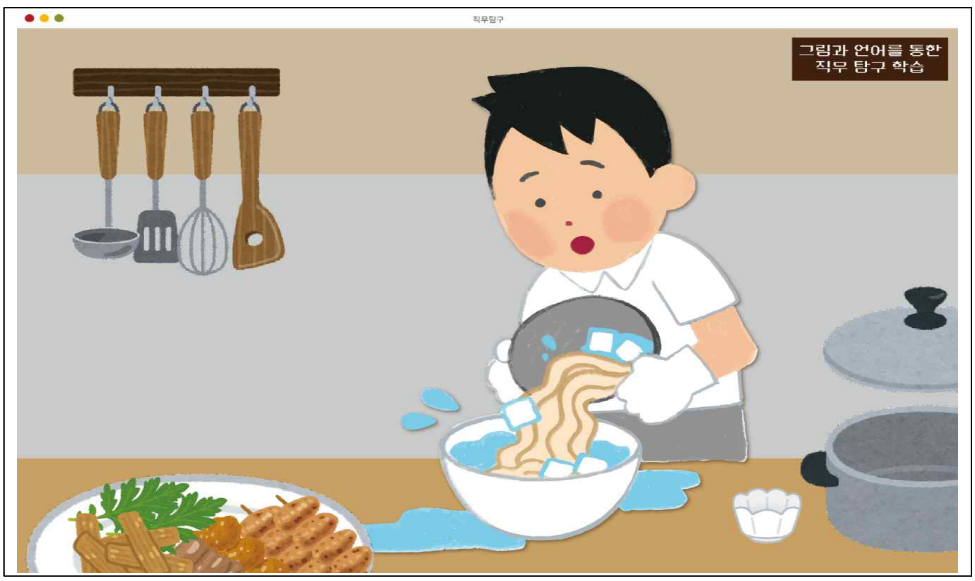
<Figure 2> Sample of Completion of Performance for the Task Analysis Step of Picture-oriented Cooking Job Skills

Next, the content of correcting the misresponse of the second cooking job skills corresponds to the performance of the participants referring to the misresponse scene for each task analysis stage of the cooking job skills and then correcting it to a positive reaction using pictures and words. Related samples are shown in <Figure 4>.

The sample of <Figure 4> was used centering on pictures, and <Figure 5> linked after the use of <Figure 4> was used centering on words. The principle and procedure of using the above content are to modify the scene of the misreaction when the participants click the scene with their mouse, and to select the finally arranged pictures and words and correct them to the positive reaction. However, <Figure 5> is the dimension that the scene of the first misreaction presented in the previous <Figure 4> is repeatedly presented in the same way, and it is the

dimension that composes the positive reaction by modifying it to words that are not pictures.

<Figure 3> Sample of Completion of Performance for the Task Analysis Step of Language-oriented Cooking Job Skills

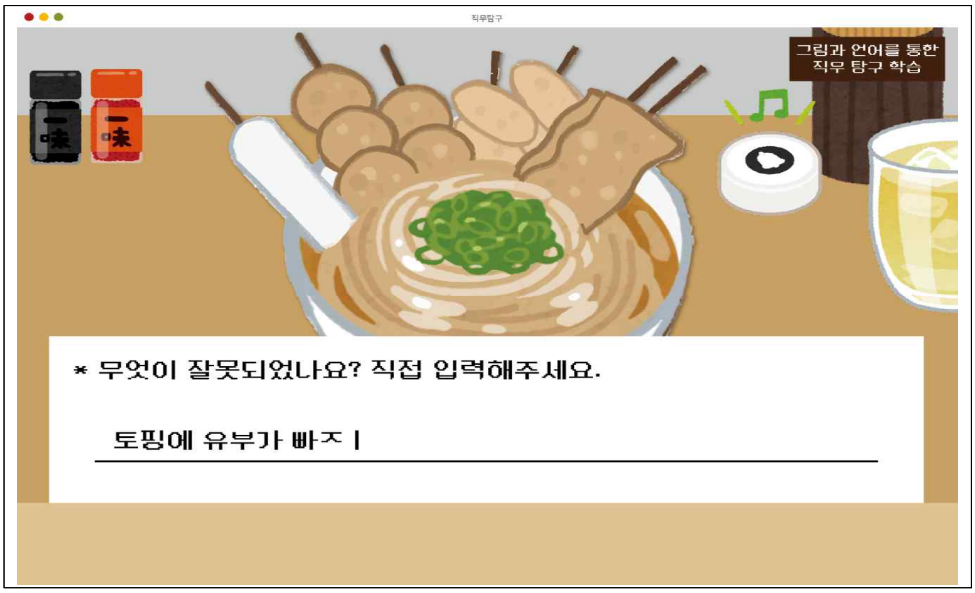


<Figure 4> Sample 1 of Contents to Correct Misresponse of Cooking Job Skills

The third content, self-reflection feedback on cooking job skills, was reflected in the process of inputting the necessary items in sentences or modified words to correct the wrong misrepresentation scene directly by the participants. The related sample is as shown in <Figure 6>. The content of <Figure 6> does not reflect the scenes of the participants' actual misreactions, but rather composes and reflects examples that the participants can express as misreactions. Accordingly, the contents of <Figure 6> intend to reflect the efforts of participants to take a more comprehensive approach to misreactions by checking in advance for misreactions related to the performance of cooking job skills or checking various misreactions after the performance evaluation. However, the misresponse cases in <Figure 6> were found to correspond to the misresponse that participants generally often see.

<Figure 5> Sample 2 of Contents to Correct Misresponse of Cooking Job Skills

To verify the validity of the research tool, two procedures were carried out: pilot study and expert review. First, the pilot study was conducted for 1.5 months on one person with ID with similar disability types and learning characteristics to the participants. And as a result of the application of the pilot study, one person with ID acquired 100% of cooking job skills through an intervention tool, and 100% of the results were found three consecutive times.



<Figure 6> Sample of Self-reflection Feedback of Cooking Job Skills

Next, an expert review on the validity of the contents of the research tool was conducted on five professors in the department of special education at the university. It was measured through the Likert 5-point scale (5: very yes, 4: yes, 3: normal, 2: no, 1: not at all), and the measurement questions and results are as shown in <Table 2>.

<Table 2> Measurement Questions and Results of Content Validity of Research Tool

Item	Contents of the question	Average (Range)
1	Has the research tool been appropriately developed according to the level and learning style of adult learners with ID?	4.85 (4.8~5)
2	Is the length and clarity of the research tool appropriate?	5 (5)
3	Is the research tool rich in the contents of cooking job skills?	4.95 (4.9~5)
4	Does the research tool consist of content that sufficiently contains pictures and language (modified words) about the performance situation and content of cooking job skills?	5 (5)
5	Does the research tool have the advantage that adult learners with ID can use as self-directed directions and personalities without relying on the guidance of instructors?	4.85 (4.8~5)

4. Research Design

This study was conducted for a total of 10 months (November 2020 to August 2021). It was conducted as a single subject research, and the technique of multiple probe design across participants was used. The experimental conditions configured accordingly are as follows.

1) Baseline

The purpose is to analyze the current level of cooking job skills before participants are provided with intervention. Accordingly, it was intended to ensure the validity that participants should be provided with intervention.

2) Intervention

Intervention was provided before the performance evaluation of the participants, and intervention was provided sequentially for each participant according to the design technique. Intervention was applied when Participant A showed a stable tendency to perform cooking job skills at the baseline stage. In addition, when the effect of applying intervention on Participant A's acquisition of cooking job skills showed a stable tendency, the intervention was applied to Participant B. Participant C also began to apply the intervention according to the outcome of the intervention of Participant B. Accordingly, all three participants were provided with intervention with a stable tendency. The application of intervention was completed when participants acquired cooking job skills at 100% of the performance level of a complete positive reaction for three consecutive times.

3) Maintenance

Four weeks after the intervention was completed, the maintenance stage was carried out three consecutive times in the same manner as the baseline. As the purpose is to find out how much the participants maintain the effectiveness of the intervention, the focus was on evaluating whether there was a misunderstanding related to the performance of the cooking job skills shown at the baseline and intervention stage.

4) Generalization

The stage of generalization was conducted at the second branch of the selected restaurant business, and location discrimination is a major issue. The degree of generalization of cooking job skills was evaluated in different situations and places of the participants without the instructor's help or promotion.

5. Dependent Variable: Cooking Job Skills

The cooking job skills applied as a dependent variable of this study is defined as the performance of participants directly cooking fish cake udon in restaurant businesses with fish cake udon as their main menu. In addition, cooking job skills was applied to the employment linkage of participants, and an agreement was made to be hired by the employer of the selected restaurant business when participants completely acquire cooking job skills. Accordingly, the task analysis for cooking job skills was directly organized by the employer as shown in <Table 3>.

<Table 3> Composition of Task Analysis of Cooking Job Skills

Item	Specific performance contents
1	After wearing sanitary gloves, pick up a fish cake skewer
2	Put one mushroom fish cake on the skewer
3	Put one beef cheese fish cake on the skewer
4	Put one piece of rice cake fish cake on the skewer
5	Put one kimchi fish cake on the skewer
6	Boil one serving of udon noodles in hot pot water for 2 minutes
7	Remove udon noodles through a tool to take out noodles and rinse them in a container with ice water
8	Put the rinsed udon noodles in a basket, remove moisture, and put them in a bowl
9	Put the fish cake skewer in the udon noodle bowl and pour the broth
10	Put seasoned green onions, red pepper powder, fried tofu, crab meat, and mugwort into the udon bowl

Since the employer is considering the employment linkage of the participants in constructing the task analysis in <Table 3>, the contents and procedures of the task analysis were independently organized at the position of the hiring decision maker. However, the employer referred to the opinions and advice of the group home teacher in the task analysis composition of <Table 3> in consideration of the characteristics of the ID of the participants.

The results of task analysis of cooking job skills organized in <Table 3> correspond to the same content and level as the tasks performed by employees at selected restaurant businesses, and correspond to the tasks that participants must acquire and perform in order to get a job. For reference, in terms of career development, participants acquired other jobs (handmade silent cooking, etc.) through the supervision and guidance of the employer after acquiring the task skills in <Table 3>.

6. Independent Variable: Multiple Job Exploration Learning Strategy through Computer-based Pictures and Language Combinations

The intervention program applied as an independent variable in this study is defined as a procedure in which participants learn the tasks of cooking job skills in multiple contexts and dimensions by using pictures and language in combination based on computers, such as the superficial meaning in terms. These intervention programs were applied with two procedures as follows.

1) Pre-orientation

Since the intervention program of this study is applied in the form and procedure for participants to refer to local restaurant businesses in the context of learning rooms in the group home, business introduction and visit were required in advance orientation. Accordingly, participants visited the business a total of five times to be introduced to various environments and facilities, and were provided with a visit schedule of about 20 minutes per time. However, the participants were not directly introduced to the contents related to the performance of cooking job skills. The employer led the participants.

2) Actual Application

Intervention was applied for a total of 2 months. Social rehabilitation teachers from the group home gathered three participants together to conduct interventions, and individual teaching were conducted at the same time according to the level of learning of the participants. Participants used an intervention tool through a computer installed with a desk, and when using the intervention tool, it was provided to promote the response of social rehabilitation teacher. To promote the

response of social rehabilitation teacher, verbal promotion was actively applied, and promotion through demonstrations and movements was provided depending on the participants' use of intervention tool.

Intervention was conducted over a total of 70 minutes per session, and was sequentially linked according to the three types of contents composed of the intervention tool. Social rehabilitation teacher provided participants with the following verbal promotion. "What's the scene now?", "What fish cake should you put on the skewer?", "Click on the fish cake with your mouse!", "Is that the fish cake you clicked on?" and "What's wrong now?", "Which one should you replace the wrong picture with?", "Choose the right words for the picture and connect them!" and "What word fish cake should come after beef cheese fish cake? You just checked from the pictures!" etc. In addition, social rehabilitation teacher instructed participants to use the content by demonstrating the use of the content displayed on the computer screen or promoting the promotion of holding hands together.

The contents composed of the intervention tools in <Figure 4>, <Figure 5> and <Figure 6> presented above were often similar to the misreactions expressed by participants while performing cooking job skills, making it easier for social rehabilitation teacher to guide participants. Accordingly, the social rehabilitation teacher made the participants aware of the prior experience with a promotion such as "You are doing the same wrong as you did wrong!"

7. Data Measurement

In this study, the data measurement was conducted directly by the employer of the restaurant business, and the scenes of the participants' performance of cooking job skills were directly observed and checked. The operational definition criteria for data measurement are shown in <Table 4>.

All scenes of participants' performance on cooking job skills under each experimental condition were videotaped, and for this purpose, one master's student majoring in special education cooperated. As for the formula for data measurement, a calculation method was used to divide the number of steps performed in the opposite of the total number of steps in task analysis and convert them into percentages.

<Table 4> Operational Definition Criteria for Data Measurement

Positive reaction	Misreaction
▪ In a case where cooking job skills are accurately performed according to the order and content of each step of task analysis ▪ When the response is started in an accurate manner within 5 seconds for each step of task analysis	▪ In a case where the cooking job skills cannot be accurately performed according to the order and content of the task analysis step by step ▪ When the response fails to start in an accurate manner within 5 seconds for each step of the task analysis

8. Interobserver Reliability

This study measured the reliability between observers to verify how reliable the results of data measurements collected by one employer were. Accordingly, the social rehabilitation teacher, who formed the task analysis of cooking job skills with the employer, participated in the data measurement in the same procedure and method to verify the reliability between observers. Reliability between observers was measured at each session of all experimental conditions of baseline, intervention, maintenance, and generalization, and when the mutual agreement between employer and social rehabilitation teacher was 98% or more, a verification procedure was conducted.

<Table 5> Measurement Results by Experimental Conditions

Item	Baseline	Intervention	Maintenance	Generalization
Participant A	100	100	100	100
Participant B	100	99.5 (99~100)	100	100
Participant C	100	100	100	99.5 (99~100)

The measurement formula used a calculation method that divides the number of matches from the total number of measurements each other and converts them into percentages. The reliability results between observers measured for each participant are shown in <Table 5>.

9. Intervention Fidelity

Intervention fidelity was measured to verify how faithfully the intervention programs constructed and applied for the participants were applied. To this end, a master's student majoring in special education accompanied and observed the intervention scene for the participants of social rehabilitation teacher. The social rehabilitation teacher explained in detail the application procedure and method of the intervention program to the above master's degree student. The measurement questions and forms of mediation fidelity were composed as shown in <Table 6>.

<Table 6> Measurement Questions and Format Composition of Intervention Fidelity

Item	Specific measurement content	Application	Nonapplication
1	Did the participants use the intervention tool within the set intervention time?		
2	Did the participants utilize the three types of content constructed in the intervention tool in a mutually sequential and linked manner?		
3	Were participants provided with verbal promotion of teachers in the process of using intervention tool?		
4	Were the participants provided with promotion through teacher demonstrations and movements in the process of using the intervention tool?		
5	Did teacher and participants actively talk about the scene of the contents while using the intervention tool?		
6	Did the participants receive individual teaching from the teacher in parallel?		

In each intervention session, the fidelity of intervention was measured, and the intervention scene was video-recorded by a master's student. As for the measurement formula, a calculation method was used to divide the number of items applied from the total number of items and convert them into percentages, centering on <Table 6>. As a result of measuring the fidelity of intervention, participants were commonly calculated at 100%.

10. Social Validity

This study measured social validity to determine the social value of independent and dependent variables in the field of education for learners with ID. Accordingly, participants and social rehabilitation teacher participated in the measurement of social validity. The Likert 5-point scale (5: Very Yes, 4: Yes, 3: Normal, 2: No, 1: Not at all) was used to measure social validity, and the trends of several previous studies (Lee, 2020; Lee & Kim, 2018; Son & Lee, 2018) were referenced in the composition of the measurement questions.

First, the measurement items and results of social validity for participants are shown in <Table 7>. Participants said, "I want to get a job quickly!", "I want to make delicious fish cake udon for customers!", "I think I'm going to make a good fish cake skewer now!", "I love computer-based classes!", "I want to study again and study hard. want!" responses, etc.

<Table 7> Questions and Results for Measuring Social Validity of Participants

Item	Measurement content	Average (Range)
1	I think I can get a job by acquiring cooking job skills through intervention tool.	5 (5)
2	I want to continue various learning by continuing to utilize online content such as this intervention tool.	4.85 (4.8~5)
3	I could understand exactly how to use the intervention tool.	5 (5)
4	I want to acquire job skills to cook various foods other than fish cake udon.	4.9 (4.9~5)
5	What was the most memorable or impressive thing?	

Next, the measurement items and results of social validity for social rehabilitation teacher are shown in <Table Ⅱ-8>. Social rehabilitation teachers who participated in the measurement of social validity reiterated the position that the intervention tool of this study should be activated to guide the independent life of adults with ID living in group homes in preparation for COVID-19. In particular, the cooking job skills is of great value in that it is an adaptive skills that can apply the residential life and local job life of adults with ID in the group home.

<Table 8> Questions and Results of Measuring Social Validity of Social Rehabilitation Teacher

Item	Measurement content	Score
1	The intervention tool of this study was effective in acquiring and generalizing cooking job skills for adults with ID residing in group homes.	5
2	For adults with ID living in group homes, cooking job skills are useful occupations in connection with residential life in group homes.	5
3	Adults with ID actively participated in the use of intervention tool.	5
4	I would like to contribute to the employment and self-reliance of adults with ID living in group homes by supplementing the intervention tool of this study or developing other similar types of tools.	4
5	What was the most memorable or impressive thing?	

Ⅲ. Results

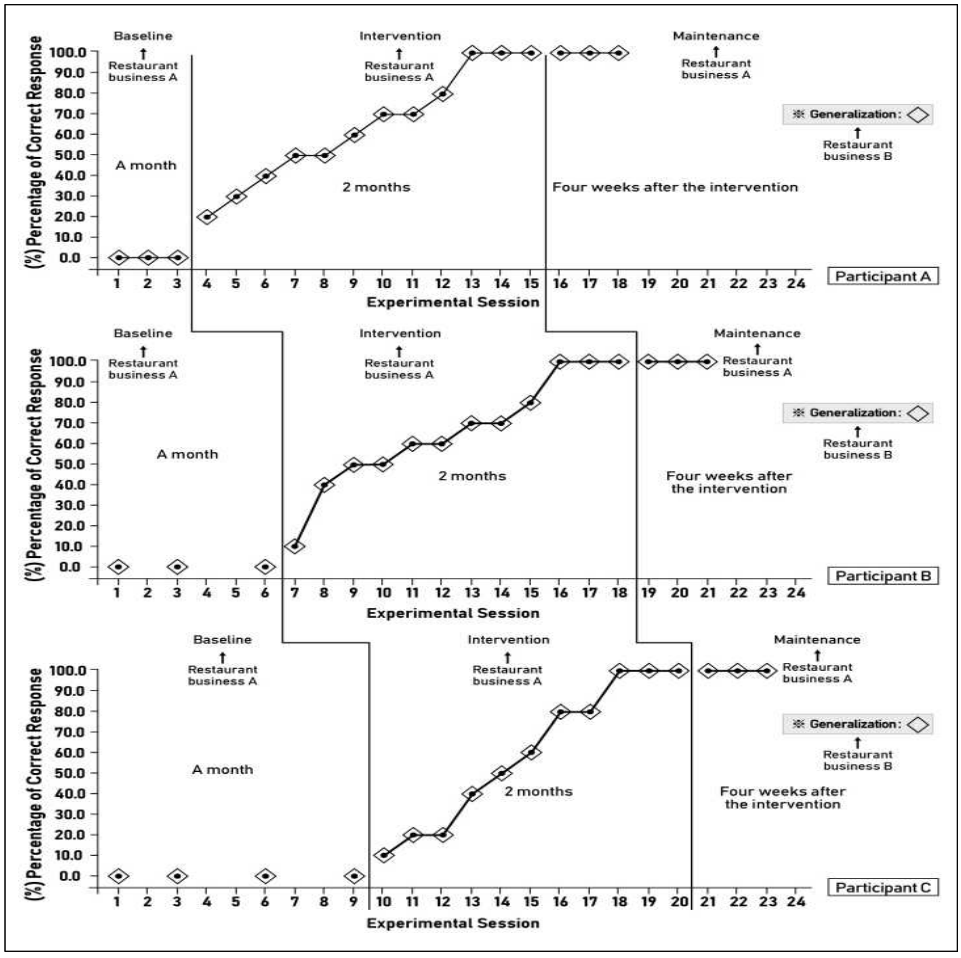
1. Effects on the Acquisition of Cooking Job Skills

Participants were found to have effectively acquired cooking job skills through multiple job exploration learning strategies through computer-based pictures and language combinations. The final result for this is as shown in <Figure 7>.

Participants were found to be unable to perform cooking job skills at the baseline stage. In other words, the participants were hardly aware of the step-by-step content of task analysis for performing cooking job skills, and did not show the appearance of trying to move in the cooking room to utilize certain facilities, tools, and materials. Participants mainly showed misresponse by continuously observing the scene where the broth of udon was boiling. As a result, participants consistently showed 0% results on the performance of cooking job skills during the baseline stage.

When the intervention was first applied, the participants showed 10~20% of the results on the positive reaction of cooking job skills. This is the result of the scope of performing steps 1 and 2 among the steps of task analysis. Participants

performed the first step of task analysis as a positive reaction, and only participants B and C performed the second step of task analysis as a false reaction. In other words, there was a misunderstanding that two mushroom fish cakes were inserted into the skewer or the mushroom fish cakes were not inserted to the bottom of the skewer. In addition, it was found that participants omitted step 3 of task analysis.



<Figure 7> Results of Positive Reaction of Cooking Job Skills by Participants

Note. In this study, the evaluation at the generalization stage was immediately linked to the cooking room in the restaurant business in another place after the evaluation at the foundation line, intervention, and maintenance stage was completed. A generalized evaluation was conducted at restaurant business B, and the travel time at restaurant business A was around 20 minutes by subway.

It was found that all participants accurately recognized that they should wear sanitary gloves and pick up fish cake skewers to perform cooking job skills. The reaction start time was also within 5 seconds along with the accurate performance method. Participants responded incorrectly by inserting two mushroom fish cakes instead of one mushroom fish cake into the skewer or inserting mushroom fish cakes into the top of the skewer when performing the second step of task analysis. In addition, the participants showed a false reaction of cutting the beef cheese fish cake in half and inserting it into the skewer in the performance of Step 3 of the task analysis. Participants showed a misresponse in performing step 4 of task analysis, indicating that only half of the total rice cake fish cake was inserted into the skewer or that the reaction start time was delayed by more than 10 seconds. The misresponse that participants had while performing step 5 of task analysis was similar to the previous step 4.

As the intervention was applied in the fourth session, the participants showed 40~50% of the results for the positive reaction of cooking job skills, which corresponds to the range of performing steps 1 to 5 of the task analysis. Participants performed the first to fifth steps of task analysis for cooking job skills in an accurate manner, and the reaction start time was also accurately within 5 seconds. However, in the case of Participant C, in performing the fifth step of task analysis, the carelessness of omitting the insertion of kimchi fish cake into the skewer or weakly inserting kimchi fish cake into the skewer was found to be a misresponse. In addition, participants A and B were found to omit performing step 6 of task analysis itself.

Participants showed the most careless behavior of adding more than one serving of udon in performing step 6 of task analysis, and the time to boil udon was often exceeded by more than two minutes. As such, the participants often had a misreaction of boiling udon in a water-filled pot or without water because they put a lot of udon was put in. In addition, in performing Step 7 of task analysis, participants often showed a false reaction to putting the pot itself in ice water, and to avoid rinsing udon in ice water. Participants showed a misresponse of putting udon in a bowl quickly without completely removing moisture from the udon in step 8 of task analysis. In addition, the participants failed to control the amount of broth in step 9 of the task analysis, resulting in a malfunction that overflowed over the udon noodle bowl. In some cases, the participants showed an erroneous reaction in which the time to pour the broth was delayed for more than

10 seconds.

Subsequently, from the 8th session of the intervention, the participants showed 70~80% of the results on the performance of the positive reaction of cooking job skills. In the previous session, participants frequently misreacted in performing step 6 of task analysis by putting two to three servings of udon noodles in the pot without putting them in the pot. In carrying out Step 7 of task analysis, the participants showed a misreaction to remove udon noodles with a ladle next to the tool rather than to remove udon noodles through the tool, and also to hold udon noodles as a tool without rinsing them in ice water. However, as the intervention was applied for more than eight sessions, the participants were found to have eliminated all of the above incorrect reactions. Participants failed to control the amount of seasoning ingredients in the udon bowl in performing step 10 of the task analysis, or showed a misresponse by adding only some of the ingredients among several seasoning ingredients. In some cases, some participants often had a delay of more than 10 seconds in performing step 10 of task analysis.

At the second half of the 10th session of the intervention, the participants showed 100% of the results for the positive reaction of cooking job skills. It was found that the misresponse (e.g., pouring too much broth without adding fish cake skewers, pouring too much broth, etc.) that the participants showed in the ninth stage of task analysis was eliminated. In addition, it was found that the participants also eliminated the misresponse (e.g., not putting all seasoned green onions, red pepper powder, etc. in the udon bowl or failing to control the amount). Finally, the participants performed cooking job skills at 100% for three consecutive times in the intervention stage, ending the intervention.

Four weeks after the end of the intervention, the participants performed 100% of the cooking job skills in the maintenance stage, and there was no misunderstanding between the baseline and the intervention stage. As a result, the participants showed consistent results of performing cooking job skills at 100% for three consecutive sessions.

2. Effects of Generalization of Cooking Job Skills

Participants showed the performance evaluation results of the generalization stage as a result that was completely consistent with the results shown in each

performance evaluation session for each stage of baseline, intervention, and maintenance. Accordingly, it was confirmed that the participants' learning effects were positively reflected without being significantly affected by the generalization conditions through the discrimination of places, and the results of the performance evaluation shown in the session of each experimental condition were more reliable.

Ⅳ. Discussion

This study was conducted with the aim of verifying its effectiveness by applying a multi-job exploration learning strategy through computer-based picture and language combinations to adults with ID residing in group homes. The discussions and conclusions through the research results are as follows.

First, it was found that the multiple job exploration learning strategy through computer-based pictures and language combinations applied in this study was effective in acquiring cooking job skills for participants with ID. This study is a case study related to vocational education of learners with ID, and the effectiveness of intervention programs has been proven as in the trends of related previous studies (Choi & Han, 2015; Ha & Choi, 2021; Hong, 2015; Hong & Lee, 2016; Kang & Shin, 2015; Kim, 2017; Kim & Park, 2020; Lee & Heo, 2017; Lee & Kim, 2018; Son & Lee, 2018). However, this study can examine the basis for intervention effectiveness through several discrimination points in this regard. First of all, the intervention effectiveness of this study is meaningful in that participants with ID accumulated the effect on acquiring cooking job skills at the level of job exploration by referring to local scenes such as learning rooms. In other words, participants with ID combined pictures and language (modified words) to complete the scene of task analysis of cooking job skills step by step, and further correct the scene of misresponse to positive reactions. This basis of inquiry suggested the possibility that participants with ID could replace the procedures and effects of acquiring and demonstrating cooking job skills in real local sites with visual indirect experiences of virtual reality. This is also thought to be due to the high consistent context between the definition of the performance of the cooking job skills selected in this study and the intervention program. Therefore, at the level of job

exploration, various job types and skills that learners with ID can acquire and educational programs and tools to mediate them should be actively developed.

If this study discusses in more detail the effectiveness of the above intervention tool, it can be seen that participants with ID have a great correlation between the learning process and the intervention effect that efficiently increases the effectiveness of learning cognition by structuring and utilizing pictures and language (modified words). In using the picture, the effect on the demonstration of the task could be achieved at an indirect level because participants with ID were encouraged to constantly explore the clues in the picture necessary to complete the task performance scene or correct it to a positive reaction. In addition, it is believed that the indirect behavioral demonstration effect has gradually increased because the procedure for exploring related words has been applied equally so that participants with ID can more concretely and accurately recognize pictures (Gast & Ledford, 2014; Yeo, 2021). In this regard, various intervention methods and effects that pictures and language-oriented words can be applied for job demonstrations of learners with ID should be reviewed.

Second, it was found that the multiple job exploration learning strategy through computer-based pictures and language combinations applied in this study was effective in generalizing cooking job skills of participants with ID. This study could generalize to participants with ID in different places where the same facilities, tools, and materials were installed, so it was possible to obtain a relatively high effects. Furthermore, as discussed above, it can be seen that the performance content and level of cooking job skills applied in this study were suitable for obtaining favorable results in generalization evaluation. In addition, when discussing from the perspective of an intervention program composed of independent variables, it can be seen that it enhances the aspect that the effect of intervention is more valid for participants with ID. If the evaluation of generalization in this study had been shown as a limited result, the aspect that the effectiveness of intervention tool and program was dynamic could not have been excluded. Subsequently, according to the context and perspective emphasized by Yeo (2021), repeated studies on the intervention program in this study should be conducted to verify the validity of the intervention effects on similar job skills.

The limitation of this study is that it is difficult to generalize the research results in that it is a single case study targeting a small number of people. Subsequently, it is necessary to expand and apply it to group experimental studies

from the perspective of repetitive studies, and efforts to select similar job skills and apply them in depth at the level of general case instruction are also needed. In addition to the limitations of this surface level, the practical limitations of this study can be considered as follows. In other words, since this study was based on the participants' computer use in constructing the intervention program, direct and repetitive demonstrations of behavior on cooking job skills could not be reflected. Since the intervention program of this study is composed of procedures and contexts of multiple packages, it seems necessary to have an advanced intervention procedure that can combine applied intervention tools and virtual-level behavioral demonstrations. If this study had applied repeated behavioral demonstrations along with computer-based intervention tools to participants in parallel, it is believed that some misreactions related to the performance of cooking job skills could have been greatly minimized. In particular, since the target behaviors of this study are cooking job skills based on direct behavioral demonstrations, it seems necessary for a procedure in which computer-based intervention tools develop into intervention procedures encompassing practical behavioral demonstrations. Finally, the above aspect is to enhance the foundation on which the intervention program of this study faithfully reflects the perspective of multiple packages from an efficient perspective.

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〈국문 초록〉

컴퓨터 기반 그림 및 언어 조합을 통한 다중 직무 탐구 학습 전략이 그룹홈 거주 지적장애인의 조리직무기술에 미치는 효과

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[목적] 본 연구의 목적은 컴퓨터 기반 그림 및 언어 조합을 통한 다중 직무 탐구 학습 전략이 그룹홈 거주 지적장애인의 조리직무기술에 미치는 효과를 검증하는 데에 목적을 두었다. **[방법]** 연구 참여자는 미취업의 상태로 그룹홈에 1년째 거주 중인 지적장애인 세 명으로 구성되었다. 실험 환경은 그룹홈 내 학습실과 식당 사업체 내 조리실로 구성되었다. 연구 설계는 단일대상연구의 대상자간 중다간헐 기초선 설계 기법이 사용되었으며, 이에 따른 실험 조건은 기초선, 중재, 유지, 일반화와 같이 네 가지로 구성되었다. 독립변인으로 구성된 중재 프로그램은 컴퓨터 기반의 온라인 콘텐츠로 볼 수 있으며, 그림과 언어를 조합하여 조리직무기술의 수행 내용을 다중적으로 탐구하는 절차를 포함한다. 종속변인으로 구성된 조리직무기술은 어묵우동을 메뉴로 하는 식당의 조리실에서 어묵우동을 직접 조리하는 수행으로 정의되며, 과제분석을 통해 총 10가지의 하위 단계로 역시 구성되었다. **[결과]** 세 명의 참여자들은 중재 프로그램을 통하여 조리직무기술을 효과적으로 습득 및 일반화한 것으로 나타났다. **[결론]** 이상의 결과를 통해, 독립변인과 종속변인의 상호 유의미한 기능적 관계가 타당하다는 측면을 결론지을 수 있었다.

주제어 : 다중 직무 탐구 학습 전략, 그룹홈, 지적장애인, 조리직무기술, 단일대상연구

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