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퀴즈기반 애플리케이션 및 연계 모방 그림그리기 활동이 전공과 지적장애학생의 조리직무기술에 미치는 효과

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The Effects of Quiz-based Applications and Linked Imitation Drawing Activities on the Cooking Job Skills of Students with Intellectual Disabilities Attending Majoring Courses

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ABSTRACT

[Purpose] The purpose of this study was to verify the effects of quiz-based applications and linked imitation drawing activities on the cooking job skills of students with intellectual disabilities attending majoring courses. **[Method]** Participants consisted of three female students with intellectual disabilities attending the majoring courses, and the experimental environment consisted of a classroom in the majoring courses and a cooking room in the restaurant business. In the study design, the multiple probe baseline design technique between participants in a single subject study was used, and the baseline, intervention, maintenance, and generalization consisted of experimental conditions. As for the independent variable, the procedure of using various contents composed of quiz-based applications as iPads and imitation drawing activities were constructed in conjunction. The dependent variable consisted of cooking tteokbokki and fried food in the cooking room of a restaurant with tteokbokki as its main menu. **[Results]** As a result of the study, participating students effectively acquired cooking job skills through intervention programs and also showed effectiveness in evaluating generalization in which locations were differentiated. **[Conclusion]** Through this, the establishment of a meaningful functional relationship between the independent variable and the dependent variable applied to the participating students and the implications of the above conclusion were discussed.

Key Words : Quiz-based applications, Linked imitation drawing activities, Majoring courses, Cooking job skills, Intellectual disabilities

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Ⅰ. Introduction

1. Necessity and Purpose of Research

The successful transition to adulthood of students with intellectual disabilities is the main foundation for determining the overall quality of life, and accordingly, a lot of weight is placed on the majoring courses that operates and manages the curriculum for transition to adulthood (Ha & Choi, 2021). In fact, the majoring courses focuses on contributing to practical social integration across various areas such as job, leisure, society, and self-determination by forming the basis for independent adult life. Accordingly, educational programs for the transition of students with intellectual disabilities to adulthood are repeatedly and actively applied through various evidence-based practices, and their effectiveness is also validly verified (Choi & Han, 2015; Hong & Lee, 2016; Kim, 2017; Son & Lee, 2018). However, in another aspect, considering COVID-19, which acts as a limiting factor in the current practical trend in the field of intellectual disability education, the above evidence-based practices and verification effects need to be improved again.

Above all, in the field of intellectual disability education, the situation of COVID-19 requires great expertise in this regard as it focuses on non-face-to-face teaching and learning support procedures and methods (Bae, Lee, & Shin, 2018; Kim, 2018; Kim & Jang, 2017). In this regard, efforts have been made to actively utilize audiovisual media through smart devices in the field of special education to transform students with intellectual disabilities into adulthood, but they are somewhat far from the purpose and effectiveness of supplementing and improving the current COVID-19 situation (Kim & Shin, 2021; Lee & Woo, 2021). This is because, even if various audio-visual media for students with intellectual disabilities have been effectively applied in the field of special education, prerequisites for supporting contact and interaction with teachers have been applied (Ahn & Lee, 2020; Oh & Jung, 2020). However, in the situation of COVID-19, it is difficult to continue the interaction scene of the class actively or intermittently face-to-face between students with intellectual disabilities and teachers as needed. Accordingly, efforts are required to more elaborate and efficiently flex the principles and applications methods of teaching and learning support based on audiovisual media for transition education for students with intellectual disabilities.

In general, the existing and current special education research trends provide the use of audiovisual media for students with intellectual disabilities through video modeling techniques (Cihak, Smith, Cornett, & Coleman, 2012; Delano, 2007; Kim & Park, 2018; Lee, 2020; Lee & Heo, 2017; Yeo, 2021). Such video modeling is used by students with intellectual disabilities through computers or smart devices, but it is insufficient to include methods and procedures to cope with the current COVID-19 situation. This is because video modeling by existing previous studies (Choi & Han, 2015; Gast & Ledford, 2014; Hitchcock, Dowrick, & Prater, 2004; Lee & Kim, 2018; Shin, 2014) presupposes face-to-face teaching and response promotion between students with intellectual disabilities and teachers, and also presupposes behavioral demonstrations in real-life scenes such as the local community. Accordingly, the perspective of repetitive research on the practice of video modeling emphasized by Yeo (2021) does not mutually respond to the current situation of COVID-19. After all, even if video modeling applied to students with intellectual disabilities is applied by reflecting real-life scenes such as communities at the level and form of reference, it is difficult to rely solely on video-related tools because it must ensure learning cognitive effects of students with intellectual disabilities (Axelrod, Bellini, Markoff, 2014; Burton, Anderson, Prater, & Dyches, 2013; Hwang & Choi, 2020; Kim & Park, 2018). Overall, in preparation for the situation of COVID-19, tools for video modeling inevitably emphasize ways to elaborately supplement and improve content that needs to be qualitatively constructed.

According to a study by Kim and Park (2018), video modeling is applied to students with intellectual disabilities ranging from subject learning to community utilization skills, but the category of effectiveness includes consistency between video tools and behavioral demonstrations. The trend of these preceding studies reminds us of the view that the content included in the video device has some limitations in describing the situation of the learning content in a specific and diverse manner, so it approaches multiple packages with behavioral demonstrations (Ha & Choi, 2021; Lim, 2021). Finally, compositional examples of content that support students with intellectual disabilities to be more systematically aware of necessary functional skills in real life scenes where adult transitions take place through smart devices should be diversified.

There are various real-life scenes corresponding to the transition of students with intellectual disabilities to adulthood, but typically businesses related to job life

can be presented as important (Kim, 2020). The current social situation of COVID-19 emphasizes the need for students with intellectual disabilities to approach the stages of exploration, practice, and intensive education and training at the level of referring to local businesses, and the level of reference above is essential to systematize and diversify content composition through smart devices. In other words, systematization and diversification of content through smart devices applied at the level of referring to local businesses streamline procedures such as teacher-centered teaching and learning support, field training, and repetitive job demonstrations, focusing on jobs accessible to students with intellectual disabilities.

Focusing on the above, this study aimed to verify the effect of quiz-based applications and linked imitation drawing activities on cooking job skills of students with intellectual disabilities attending majoring courses. The results of this study can be used as basic data for reference in developing and applying transition education programs for students with intellectual disabilities in the COVID-19 situation.

2. Research Questions

The research questions for research purposes consisted of two types. First, what is the effect of quiz-based applications and linked imitation drawing activities on the acquisition of cooking job skills for students with intellectual disabilities? Second, what is the effect of quiz-based applications and linked imitation drawing activities on the generalization of cooking job skills for students with intellectual disabilities?

Ⅱ. Method

1. Research Participants

Participants in this study are three students with intellectual disabilities attending the majoring courses of special school in S City. Participants have been enrolled in the majoring courses for a year, and are currently preparing to get a job in the form of a part-time job related to cooking. Accordingly, this study was conducted

by a homeroom teacher who teaches participants in the majoring courses participating as a instructor. The basic information of participants with intellectual disabilities is shown in <Table 1>.

<Table 1> Basic Information of Participants

Item	Participant A	Participant B	Participant C
Age	19 years old	19 years old	19 years old
Gender	Female	Female	Female
Disability type	Intellectual disability	Intellectual disability	Intellectual disability
K-WISC-Ⅳ	52	55	49
KNISE-SAB	60	61	65
Preferred learning style	Classes using audiovisual media are preferred, and learning understanding is easier through drawing	Classes using audiovisual media are preferred, and class information is searched through computers	Preferring classes using audiovisual media. Focus on classes using checklists, photos, and pictures
Communication ability	Relatively accurate communication of one's own opinion, but not listening to others' opinions	The pronunciation is somewhat inaccurate for difficult words or sentences, making it difficult to communicate	Speaks to others in a voice that is too small and only communicates with intimate colleagues
Daily behavioral problems	Often shows stubborn behavior to get the desired object, etc. Stubborn to avoid the other person	Parents need a lot of help because they are not able to manage time well or because of delays in meeting with friends.	Avoidance behavior that does not meet the eye with an unfriendly opponent often appears, but does not show avoidance behavior when feel good
Movements and basic learning ability	Walking and finger movement are relatively free, and basic learning ability is utilized to enable subject learning	Walking and finger movements are relatively free. Difficult to count related to mathematics	No problem moving and good at using chopsticks. Having a hard time summarizing complex content
Pre-experience in cooking	No prior experience. Knows some of the functions of tools and ingredients necessary for cooking, but cannot directly demonstrate cooking through them	No prior experience. Knows some of the functions of tools and ingredients necessary for cooking, but cannot directly demonstrate cooking through them	No prior experience. Knows some of the functions of tools and ingredients necessary for cooking, but cannot directly demonstrate cooking through them

Participants not only finally agreed to participate in this study with the consent of their parents, but also hoped to get a job at a part-time restaurant business through this study. In addition, the homeroom teacher, who coached participants with intellectual disabilities, obtained a doctorate on the subject of special educational engineering and has been in the majoring courses for 19 years. This study was finally developed and operated through cooperation with a restaurant business that signed a regional contribution agreement with a special school where the homeroom teacher was in charge. Participants not only showed similar learning abilities and characteristics, but also had no prior experience in cooking job skills, and had no prior experience related to the intervention program developed by the teacher, so it was appropriate to participate in this study.

2. Research Design

This study was conducted for a total of 10 months (December 2020 to September 2021). For the research design, the technique of designing a multiple probe baseline between participants was used through a single subject research. And the experimental conditions consisted of four types: baseline, intervention, maintenance, and generalization.

1) Baseline

It was conducted in a way that the instructor did not provide help or promotion for the participants' performance of cooking job skills. Through this, the level of the participants' current cooking job skills was analyzed.

2) Intervention

The intervention was applied before the performance evaluation of the participants' cooking job skills was conducted. In addition, the timing of applications of intervention was differentiated for each participant according to the research design technique.

First, when participant A showed a stable tendency to perform cooking job skills at the baseline stage, intervention was applied to participant A. In addition, when participant A showed a stable tendency to perform the positive reaction of cooking job skills according to the applications of intervention, intervention was also applied

to participant B. Subsequently, according to the results of the intervention applications of participant B, the intervention began to be applied to participant C.

The intervention was terminated when the participants performed cooking job skills at 100% of the level of complete positive reaction for three consecutive times.

3) Maintenance

Four weeks after the end of the intervention, participants were evaluated for maintenance performance of cooking job skills. The implementation procedure and method are the same as the stage of the baseline.

4) Generalization

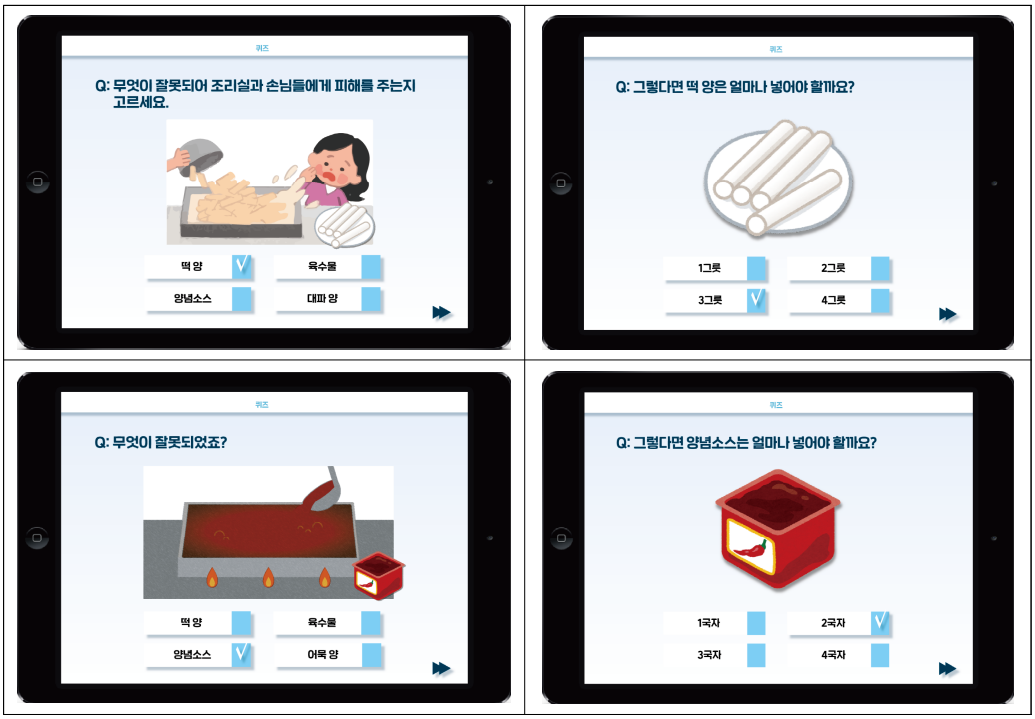
Since generalization was conducted at the second branch of the selected restaurant business, generalization evaluation was conducted for three times through discrimination of the place. The instructor did not provide help or promotion.

3. Research Tool

This study developed and applied two tools for intervention. The first is an intervention tool for participants to use iPad applications, and the intervention tool above includes apps through the composition of various contents. The composition direction and table of contents of the app were organized by referring to the results of preceding case studies (Hwang & Choi, 2020; Kim & Jang, 2017; Kim & Park, 2018; Lim, 2021; Oh & Jeong, 2020) that applied smart apps to students with intellectual disabilities. However, the preceding studies above were found to have some difficulty in directly affecting the development of intervention tools in this study because there were more case studies applied from the perspective of improving subject learning or problem behavior than from the perspective of students with intellectual disabilities. In addition, the basic context and direction for content composition were somewhat far from each other because it was based on daily and residential life rather than job life, which has a high proportion of functional skills for students with intellectual disabilities to transition to adulthood.

Focusing on the above aspects, this study systematized the contents of the iPad applications into five categories. In this study, since participants use the iPad

<Figure 1> Sample of a Quiz-based Applications



<Figure 1> Sample of a Quiz-based Applications (continued)

applications in the form of referring to the cooking room in the local restaurant business in the classroom situation, the composition of the content should be diverse and contributed to the learning cognitive effect. Accordingly, the composition of the content consisted of (1) guidance on the restaurant environment and facilities, (2) guidance on job tools and materials, (3) guidance on job task performance, (4) guidance on job misresponse, and (5) guidance on job-related pro-social performance. Through the above five contents, an intervention tool was configured so that participants could use the iPad applications. In addition, this study also reflected the quiz procedure by content so that the iPad applications can further enhance the learning perception effect of participants on cooking job skills. Through the above quiz principle, it was intended to promote participants to broaden their awareness of the performance status and content of cooking job skills, and it was organized with reference to the quiz learning effect proposed by some previous studies (Lee & Jeon, 2011). Finally, the development results of the quiz-based iPad applications are as shown in <Figure 1>.

Next, this study constructed imitation drawing paper as a second intervention

tool. The above intervention tool was applied in conjunction after the iPad applications, which corresponds to the first tool, and was designed to promote participants to enhance the learning perception effect of cooking job skills in the context of supplementary learning. It is a procedure in which participants imitate the scene guided by the iPad applications by drawing, and was performed using colored pencils and drawing papers. As a result, imitation drawing paper can enhance its value as a link tool for participants to more lead and easily utilize iPad applications. In addition, this reflects the intervention procedures that the use of audiovisual media such as video modeling should be supplemented by previous studies (Kim & Jang, 2018; Kim & Park, 2018; Son & Lee, 2018).

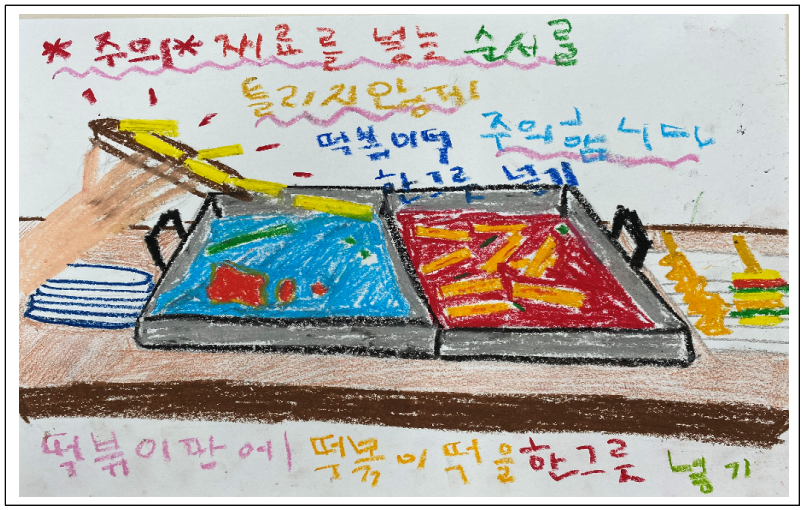
This study went through a pilot study and expert review procedure to verify the validity of the research tool. First, the pilot study was conducted for 1.5 months on one student with intellectual disabilities with similar disability types and learning characteristics to the participants. Along with the cooking job skills constructed in this study, research tools were applied to one student with intellectual disabilities, and after one month, the above student acquired cooking job skills with a positive reaction of more than 90%.

Next, this study verified the content validity of research tools for five professors belonging to the department of special education at universities majoring in intellectual disability. The verification of the above content validity was made through the Likert 5-point scale (5: very yes, 4: yes, 3: normal, 2: no, 1: very no). The measurement items and results are shown in <Table 2>.

<Table 2> The Content Validity Measurement Items and Results of the Intervention Tools

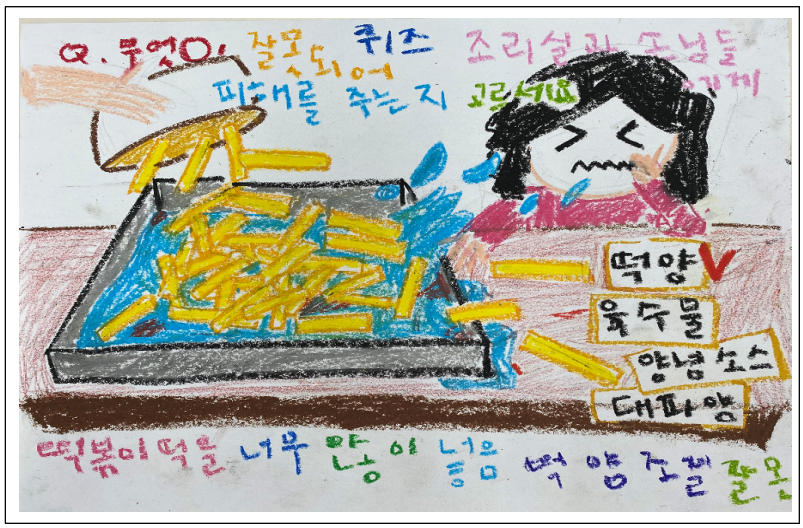
Item	Measurement questions	Average (Range)
1	Is the number and length of content configured in the iPad applications appropriate?	4.85 (4.8~5)
2	Does the iPad applications ensure the usability and learning effectiveness of students with intellectual disabilities?	4.8 (4.8~5)
3	Is there any problem with interference noise or clarity while using the iPad applications?	5 (5)
4	Are iPad applications and imitation drawing activities appropriate for interconnection?	5 (5)
5	Did the intervention tools specifically reflect the task of performing cooking job skills?	5 (5)

<Figure 2> shows the composition sample of imitation drawing paper, which is the second intervention tool.



<Figure 2> Sample 1 of Imitation Drawing Paper

In addition, samples such as <Figure 3> were also performed by the participants in connection with the previous <Figure 2>. <Figure 3> corresponds to a quiz-oriented imitation drawing activity as presented.



<Figure 3> Sample 2 of Imitation Drawing Paper

4. Research Procedure

1) Experimental Environment

In this study, the experimental environment was composed of three types and is largely classified into an intervention environment and an evaluation environment.

(1) Classroom of the Majoring Courses for Intervention

Intervention was applied in the classroom of the majoring courses where the participants were attending, and there was no environmental reconstruction procedure because the intervention was conducted as a procedure using desks and stationery that were normally used. The teacher and three participants gathered together to form a scene of intervention.

(2) Restaurant Business A's Cooking Room for Evaluation

The evaluation was conducted in the cooking room of a restaurant business with tteokbokki as its main menu, and the situation of the cooking room that employers and employees usually use was reflected as it is. The cooking room is equipped with gas facilities and related tools and ingredients for cooking tteokbokki.

(3) Restaurant Business B's Cooking Room for Generalized Evaluation

The selected restaurant businesses operated their first and second stores around nearby streets, so the generalization evaluation of participants was conducted at the second store. Since the second store, where generalization evaluation was conducted, was installed as a facility similar to the first store, no environmental reconstruction was required. The evaluation of generalization was finally conducted by discriminating places.

2) Independent Variable: Quiz-based Applications and Linked Imitation Drawing Activities

The intervention program consisting of independent variables in this study was applied before the performance evaluation of the participants' cooking job skills, and was also conducted for a total of 70 minutes per session. The participants' homeroom teacher became a instructor and was in charge of intervention, and a direct intervention tool was also developed. The intervention program composed of two tools was largely applied to the participants in two procedures.

(1) Pre-orientation

In this study, since participants apply intervention tools in a virtual form in a classroom situation, a procedure to explore selected restaurant businesses was required in advance. Accordingly, the participants explored the restaurant business selected five times and explored about 30 minutes per session. Participants explored the restaurant business together and were guided by instructor and employer to provide orientation on the overall environment of the business, job culture, and characteristics of the cooking room. Here, instructor and employer mainly guided participants through verbal promotion, and clues related to intervention and cooking job skills were not promoted.

One important thing in the pre-orientation was that it was intended to guide participants to recognize the job culture and functions of selected restaurant businesses as well as the cooking job skills themselves acquire. This is because it is very important as an adaptive behavior that participants must basically accompany in approaching restaurant businesses to acquire cooking job skills.

(2) Actual Application of Intervention

The intervention was carried out together with participants gathered in one classroom. Among the procedures in which the two intervention tools were interconnected, intervention was applied to the participants.

First, participants used quiz-based iPad applications sitting at desks in the classroom. Each of the three participants sat at a desk at a certain distance in one classroom and used an iPad applications, and while receiving the instructor's response promotion, they acquired the contents of cooking job skills through the above intervention tool. The applications used by participants through the iPad consists of multiple contents as shown in <Figure 1>. Participants used contents related to (1) restaurant environment and facility guidance, (2) job tools and materials guidance, (3) cooking job task performance guidance, (4) cooking job task misresponse guidance, (5) cooking job task-related pro-social performance guidance. Instructors mainly provided response promotion in the form of direct teaching, focusing on verbal promotion. In other words, the instructor provided response promotion through demonstration or physical promotion when participants could not use the applications skillfully through the iPad, but mainly provided verbal promotion through conversation. In addition, the applications used by the participants through the iPad reflect quizzes for each content as shown in <Figure 1>, so the verbal

promotion of the instructor related to this was actively provided. When participants solve the quiz, they were asked to solve the quiz on their own first, and then the instructor provided feedback on the result. Examples related to this are shown in <Figure 4>.

- Instructor: Okay! Should I solve the quiz? It's going to be easy because you've learned so far.
- Participant: Yes! Teacher.

(Participant quiz solving)

- Instructor: Is the staff adding the right amount of tteok for the quiz? The amount of rice cake?
- Participant: No! There's too much rice cake.
- Instructor: What should we do then? How much should I put in?
- Participant: 1 bowl! But in the quiz scene, the model is putting in 2 bowls.
- Instructor: Right! You know it so well.
  Do you know what happens if you put in 2 bowls like the model?
- Participant: The broth on the tteokbokki board is overflowing! Broth! It's overflowing!
- Instructor: Right! "Broth" and "Spill" are the key points!

(The rest is omitted.)

<Figure 4> An Example of a Quiz Teaching Using an Applications

In addition, the content composition of quiz-based applications was embodied as shown in <Figure 5>. The sample of <Figure 5> focuses not only on using the quiz in the form of multiple choice, but also on allowing participants to interpret and recognize specific contexts and contents related to the situation organized in the quiz scene in various ways. Through this, participants were guided not only to perform cooking job skills acquired in terms of employment linkage, but also to cultivate job atmosphere, culture, and rules related to performance in connection.

Next, participants were provided with intervention in imitation drawing activities in connection with the procedure of the iPad applications. Here, the imitation drawing activity corresponds to the procedure and method of reproducing the content used by the participants in the procedure of the iPad applications into a picture. Through this, it was intended to further enhance the specific learning cognitive effect of the participants' content composition scenes of the applications. The instructor mainly provided verbal promotion when the participants performed imitation drawing, and the same procedure as in <Figure 4> was similarly applied. In addition, imitation painting activities focused on the procedure of reproducing

pictures, but also on the procedure of reflecting key sentences and words related to paintings. This is to link and reflect the quiz scenes of the content configured in the applications, and ultimately aims to increase the overall learning perception effect related to the participants' performance of cooking job skills.

<Figure 5> An Advanced Quiz Composition Sample of Applications

<Figure 6> shows an in-depth sample of imitation drawing activities performed by participants in connection with the samples in <Figure 2> and <Figure 3> presented above.

<Figure 6> Deep Sample of Imitation Drawing Activities

3) Dependent Variable: Cooking Job Skills

(1) Background and Motivation for Selecting Dependent Variables

The cooking job skills, consisting of the dependent variables of this study, is also a result of reflecting the participants' job aptitude and interest, but it is more relevant that the employer's intention to link employment of the selected restaurant business was positively considered. In other words, the employer of the restaurant business expressed his intention to hire part-time participants if they acquire cooking job skills at a level of complete positive response. Finally, the cooking job skills of this study have the motivation and background of the participants' acquisition in terms of employment linkage.

(2) Composition of Task Analysis of Dependent Variable

<Table 3> shows the results of task analysis of cooking job skills composed by employer. The task analysis results of <Table 3> were organized in the same way as the level and content of work performed by employees in the business.

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

Item	Specific performance contents
1	Pour 1 bottle of broth into the tteokbokki board
2	Add 2 ladles of seasoning sauce to the tteokbokki plate and stir
3	Cut 8 sheets of fish cake with scissors and put them in the tteokbokki board
4	Put a bowl of tteokbokki rice cake into the plate
5	Turn on the gas stove on the tteokbokki board over medium heat
6	Stir the tteokbokki rice cake through a ladle
7	Put 1 bag of green onion into the tteokbokki plate
8	Cook tteokbokki rice cake and various ingredients (fish cake, green onion) for 5 minutes
9	Put the fried food in a fryer and fry it for 10 seconds and place it on the oil remover
10	Cut the fried food into three parts with scissors, place it on a bowl, and put the tteokbokki on top of the fried food

The task analysis contents of <Table 3> are composed of tteokbokki cooking and frying cooking, and correspond to the job tasks that participants must primarily acquire to get a job at a selected business. In addition to tteokbokki and fried food, the selected businesses have a variety of menus such as fish cake soup and sundae, but at the request of the employer, participants have acquired cooking job skills centering on tteokbokki and fried food.

4) Data Measurement

Data measurement was performed directly by the employer who organized the task analysis of cooking job skills. The employer evaluated the performance of cooking job skills through direct observation while maintaining a certain distance from the participants. In addition, the employer constructed an operational definition of the performance of cooking job skills such as <Table 4> for data measurement.

<Table 4> Operational Definition Criteria Related to Data Measurement

Corrective reaction	Wrong reaction
· In the case where the cooking job skills were independently performed by the procedure and method of task analysis without providing intervention by the instructor · In the case where the reaction start time is within 5 seconds and the response is accurately performed for each stage of task analysis of cooking job skills	· In the case where the instructor's intervention is provided or cooking job skills are performed incorrectly regardless of the procedure and method of task analysis · In the case where the reaction start time is delayed by more than 5 seconds or the reaction is initiated in an inaccurate method for each stage of task analysis of cooking job skills

For the calculation of data measurement, a formula was used to divide the number of steps performed by corrective reaction among the total number of steps in task analysis and convert them into percentages. In addition, the employer videotaped every scene of data measurement.

5. Data Processing

1) Interobserver Reliability

Reliability between observers was measured to verify the reliability of data measurement. Accordingly, a procedure for measuring reliability between observers was performed in each session of all experimental conditions such as baseline, intervention, maintenance, and generalization. In addition, instructor who cooperatively organized the task analysis of cooking job skills with employer participated in the process of measuring reliability between observers. Employer and instructor accompanied each other in the scene of data measurement to measure reliability between observers, and prior to actual reliability measurement,

the degree of agreement with each other for data measurement of data measurement was checked. When the inspection results were calculated by 98% or more, the reliability between actual observers was measured.

The employer and instructor not only measured the reliability after measuring the data in the actual restaurant scene, but also performed the secondary reliability measurement by referring to the videotaped scene later. For the calculation of the reliability measurement between observers, a formula was used to sum the number of matches and inconsistent numbers of data measurements, divide the number of matches, and convert them into percentages. The reliability results between observers measured for each participant are shown in <Table 5>.

<Table 5> Results of Reliability Measurement between Observers by Participant

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

2) Intervention Fidelity

Intervention fidelity was measured to verify how faithfully the intervention program consisting of independent variables was applied to the participants. To this end, a doctoral student majoring in special education accompanied the instructor's intervention scene to measure the fidelity of intervention. The instructor informed the above assistant in advance of the application procedure and method of the intervention program, and provided measurement items and forms of intervention fidelity such as <Table 6>.

<Table 6> Measurement Questions for Fidelity of Intervention

Item	Specific measurement questions	Application	Nonapplication
1	Were participants provided with pre-orientation for business exploration prior to the application of the actual intervention?		
2	Were participants provided with quiz-based iPad applications?		
3	Were participants provided with imitation drawing activities in connection with the iPad applications?		
4	Did the participants receive the instructor's response promotion by using the intervention tools?		
5	Did the participants specifically learn the content configured in the applications at each intervention session?		
6	Did the participants reenact the scenes of the contents organized in the applications with imitation drawing activities in each intervention session?		

The fidelity of intervention was measured in all sessions of intervention, and the assistant directly observed the instructor's intervention scene while also performing video taping. For the measurement calculation of intervention fidelity, a formula that divided the number applied from the total number of questions and converted it into a percentage was used, centering on <Table 6>. Finally, the fidelity of intervention was calculated as 100% for each participant.

3) Social Validity

Social validity was measured to verify the social values and significance of independent and dependent variables constructed in this study in the field of education for the transition of students with intellectual disabilities to adulthood. Social validity was measured for the participants and instructor of this study, and the Likert 5-point scale (5: very yes, 4: yes, 3: normal, 2: no, 1: not at all) was used for the measurement.

First, the measurement items and results of social validity for the three participants are shown in <Table 7>. Participants responded that the use of intervention tools was too enjoyable and expressed their strong will to get a job in relation to question 5 of <Table 7>.

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

Item	Specific measurement questions	Average (Range)
1	I think I can acquire cooking job skills and get a job through imitation drawing activities linked to the quiz-based applications.	5 (5)
2	I enjoyed using the quiz-based applications through the iPad.	4.95 (4.9~5)
3	In addition to using quiz-based applications through iPad, I was able to learn cooking job skills more easily through imitation drawing activities.	5 (5)
4	In the future, I want to acquire other job skills through quiz-based applications and linked imitation drawing activities.	4.95 (4.9~5)
5	What was good or impressive about participating in this educational program?	

Second, the measurement items and results of social validity for instructor are shown in <Table 8>. In particular, in relation to question 5 of <Table 8>, the instructor primarily emphasized that the intervention tools applied in this study should be activated in various forms in preparation for the social situation of COVID-19. In addition, the instructor emphasized the need to standardize teaching and learning support measures and tools that can be embodied in the form of a model in which students with intellectual disabilities gradually shift from the level of reference to the level of field.

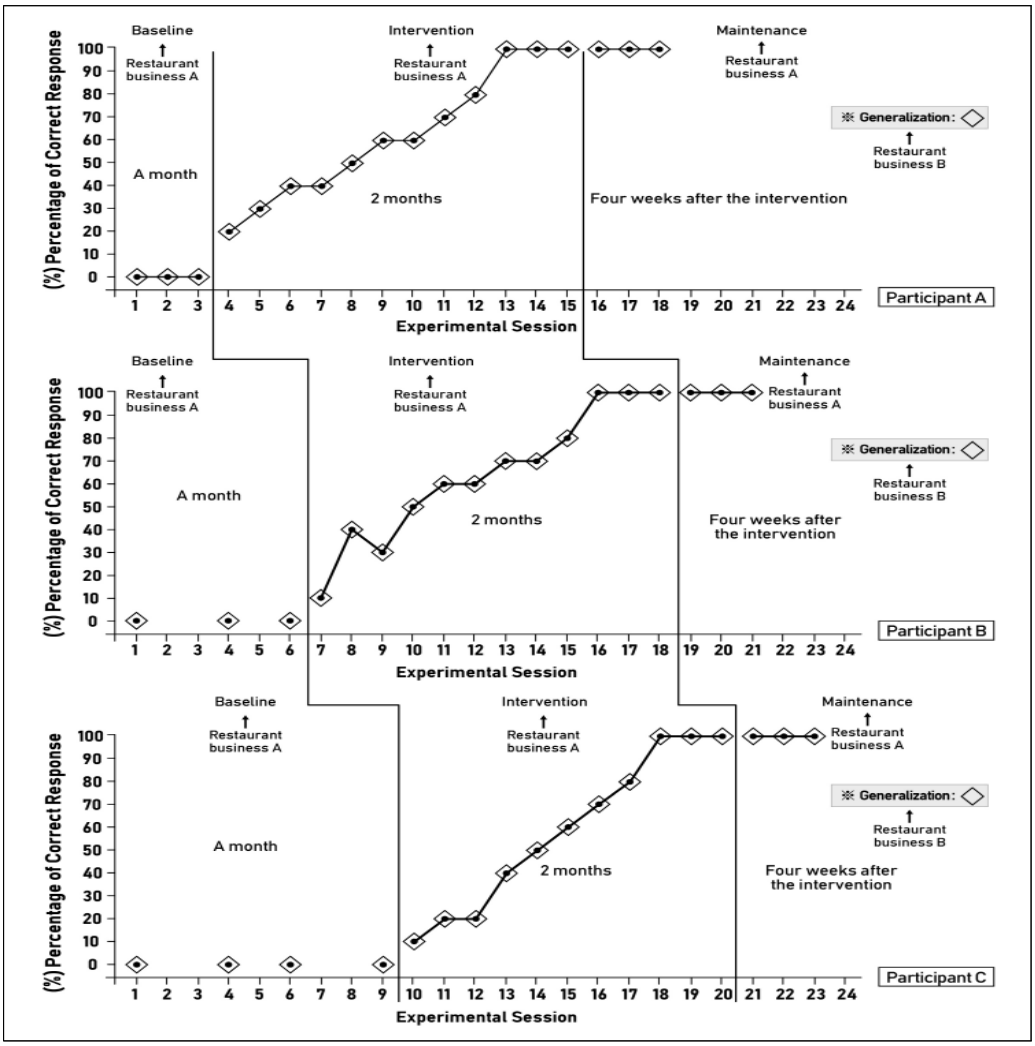
<Table 8> Questions and Results for Measuring Social Validity for Instructor

Item	Specific measurement questions	Value
1	The intervention program of this study was effective in acquiring and generalizing participants' cooking job skills.	5
2	Cooking job skills are practically useful for students with intellectual disabilities in employment through transition to adulthood.	5
3	Students with intellectual disabilities showed active interest in quiz-based iPad applications and imitation drawing activities linked to them, and the effect of learning awareness was also stably accumulated.	5
4	Starting from this study, I would like to develop an educational program for students with intellectual disabilities to transition to adulthood through teacher training or cooperation with the local community and apply it to various job skills.	5
5	What are the implications of this study for the majoring courses field of special education?	

Ⅲ. Results

1. Effects on Acquiring Cooking Job Skills

Participants with intellectual disabilities effectively acquired cooking job skills through quiz-based iPad applications and linked imitation drawing activities. The final results related to this is as shown in <Figure 7>.



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

At the baseline stage, it was found that participants were hardly aware of the procedure and method of performing cooking job skills step by step in task analysis. In fact, participants consistently showed 0% results at each session in the performance evaluation of cooking job skills conducted at the baseline stage. Participants often responded incorrectly by standing still or holding a bottle of water with their hands, even though they had to pour a bottle of broth on the tteokbokki board first to perform cooking job skills.

On the other hand, as intervention was applied to the participants, the ratio of positive reaction performance of cooking job skills improved with a relatively stable tendency. When the intervention was applied in the first session, the participants showed 10% to 20% of the results for the positive reaction of cooking job skills. Participants showed 10~20% of the results within the scope of performing steps 1 and 2 of the task analysis steps of cooking job skills, and in the performance of step 2, there was a malfunction in which the amount of seasoning sauce could not be adjusted or the seasoning sauce was dropped around to make it messy.

From the fourth session of the intervention, participants showed a 40~50% range of results for the positive reaction of cooking job skills. Participants showed 40~50% of the results within the scope of performing steps 1 to 5 of the task analysis steps of cooking job skills, and were found to have eliminated all previously seen incorrect reactions. Participants B and C performed step 5 of task analysis of cooking job skills, but repeatedly showed an erroneous reaction of turning on the gas fire too hard, which was measured as a result of 40%. Participant A performed steps 1 to 5 of the task analysis of cooking job skills in a united manner, but in performing steps 6, the reaction start time was delayed by more than 10 seconds and was treated as an incorrect reaction.

From the 8th session of the intervention, the participants showed a 70~80% range of results for the positive reaction of cooking job skills. Participants A and B performed steps 1 to 7 of the task analysis steps of cooking job skills as a positive reaction, but the time adjustment was incorrect in the performance of step 8. In other words, they showed an erroneous reaction to perform step 9 immediately even though 5 minutes had passed, and in some cases, they showed an erroneous reaction to perform step 9 belatedly after 5 minutes.

As the intervention was applied in the 10th session, the participants performed step 8 of the cooking job skills as a positive reaction, and it was found that the incorrect reactions of steps 9 and 10 were also eliminated. Participants often

reacted incorrectly, such as carelessness in putting fried food in the oil container for more than 10 seconds or putting too much fried food in the oil container at once, in carrying out step 9 of the task analysis. In addition, the participants often showed incorrect reactions in performing step 10 of task analysis by not cutting fries with scissors or cutting three parts into two parts. However, it was found that participants completely eliminated this misresponse from the 10th session of the intervention. Finally, the intervention was terminated because the participants performed cooking job skills at 100% of the level of complete positive reaction for three consecutive times.

2. Effects of Generalization of Cooking Job Skills

Participants all showed consistent results in generalized evaluations conducted in connection with each experimental condition of baseline, intervention, and maintenance. The results are as shown in <Figure 7>. In this study, generalization evaluation was conducted by discriminating places, and it was found that participants generalized the acquisition effect of cooking job skills to a stable tendency regardless of the location discrimination. Accordingly, the effectiveness of the cooking job skills acquired by the participants through the intervention program could be more reasonably improved. As a result, the participants showed the same positive and incorrect responses to the performance of cooking job skills in the basic line, intervention, and maintenance stages at the generalization stage.

Ⅳ. Conclusion and Discussion

The purpose of this study was to investigate the effects of quiz-based iPad applications and linked imitation drawing activities on the cooking job skills of students with intellectual disabilities attending majoring courses. Discussion and suggestion focusing on the conclusions on the research results are as follows.

First, quiz-based applications and linked imitation drawing activities were effective in acquiring cooking job skills for students with intellectual disabilities. Among the evidence-based intervention techniques applied to students with

intellectual disabilities in the field of special education, this study has similar application principles and context to video modeling, visual cues, and self-checklists, and their effectiveness was also similar (Hong & Lee, 2016; Kim & Jang, 2017; Kim & Park, 2018; Lee & Heo, 2017; Shin, 2014). However, in this regard, several discrimination points of this study can be considered. First of all, the use of audio-visual media through iPads was activated at a level specializing in reference to local businesses, and accordingly, the field-oriented behavior demonstration procedure was omitted despite the regional linkage skills for students with intellectual disabilities to transition to adulthood. In general, cases in which field-oriented behavioral demonstration procedures are omitted are cases in which students with intellectual disabilities apply functional skills such as daily and residential life rather than job skills related to job life (Hwang & Choi, 2020; Kim, 2017; Son & Lee, 2018). Accordingly, the acquisition of job skills by students with intellectual disabilities was difficult to achieve through intervention procedures through reference from local businesses, and the promotion of direct teaching and repeated demonstrations by experts such as teachers consisted of major intervention techniques (Choi & Han, 2015; Ha & Choi, 2021; Kim & Kim, 2021a; 2021b; 2021c; Oh & Jung, 2020). Beyond this category, the possibility of students with intellectual disabilities to increase the learning perception effect of job skills was limited, and even if reference intervention procedures were applied, field-oriented intervention procedures were necessarily premised (Hong, 2015; Kim, 2020; Son & Lee, 2018).

As described above, the part where this study was able to specialize in arbitration procedures referring to local businesses is due to the "iPad applications". Several previous studies (Ha & Choi, 2021; Kim, 2018; Kim & Jang, 2017; Lee & Jeon, 2011; Lim, 2021) also applied iPad applications to students with intellectual disabilities, but daily and residential life or problem behavior elimination usually appears as the main learning material. The trend of these preceding studies enhances the aspect that the iPad itself cannot be generalized to the level of job acquisition for students with intellectual disabilities to transition to adulthood, even if it can be used as a substitute for the effects of intervention techniques such as video modeling. Therefore, this study is significant in that it specializes in the job life, which is a major achievement factor in the transition to adulthood of students with intellectual disabilities.

However, the iPad applications itself cannot be considered as the part where this

study could effectively apply the cooking job skills applied to students with intellectual disabilities in terms of vocational life and employment linkage. In the case of iPad applications, it is important for students with intellectual disabilities to consider constituent factors that can be linked to the cognitive effect of learning beyond the level of physical tools. In this regard, primarily, this study reflected the principle of contents composition of an applications through an iPad as a quiz. In this study, the quiz was considered to promote clearer and more efficient awareness of the performance of cooking job skills rather than simply asking questions to students with intellectual disabilities. Through the principle of the quiz, students with intellectual disabilities were able to have an opportunity to check the performance of related misreactions and pro-social behavior as well as guidance on the procedure and method of performing cooking job skills. If this study had guided students with intellectual disabilities to perform cooking job skills by omitting the principle of the quiz, it would have been difficult to expect the effectiveness of the intervention. In this study, students with intellectual disabilities acquired cooking job skills that require direct action demonstration through intervention tools consisting of language and pictures, so quizzes are practical factors that contributed to enhancing the learning perception effect of students with intellectual disabilities. Looking at the study of Yeo (2021), which emphasized repeated research on evidence-based intervention practice factors in the field of special education, it is difficult to find cases of job acquisition by students with intellectual disabilities using quizzes. In addition, even looking at the case of intervention in video modeling considered by Kim and Park (2018), it appears that the case where the principle of the quiz is reflected as a structural dimension of learning content is insufficient. Therefore, starting with this study, case studies that integrate and utilize the principles of quizzes and iPad applications should be activated to structure the learning contents for job acquisition of students with intellectual disabilities.

Next, this study constructed an intervention procedure that imitated a quiz-based applications and linked it to a drawing activity. Here, drawing activities correspond to intervention techniques commonly applied to students with intellectual disabilities as part of visual cues and reaction promotion, but this study applies more visual cues and reaction promotion. This study considered that even if the iPad applications was actively applied through the principle of the quiz, a procedure to more specifically promote the learning cognitive effect of students with intellectual

disabilities on cooking job skills is additionally required. In this regard, it was considered that imitation drawing activities were more efficient in consideration of students' interest in learning and self-directed learning participation than the procedure of repeatedly applying quiz-based applications to students with intellectual disabilities. For students with intellectual disabilities, the drawing activity itself is performed by imitating the scenes composed of the contents of the iPad applications, minimizing intervention procedures such as promoting the instructor's response or repeated visual checks (Choi & Han, 2015; Kim, 2017; Kim & Kim, 2021d; Lee & Heo, 2017). Overall, this study organized intervention tools and procedures focusing on the flow of students with intellectual disabilities to gradually increase their learning awareness and effectiveness on the performance of cooking job skills, from quiz-based iPad applications to linked imitation drawing activities. This trend was actually found to be a consistent and stable tendency with the degree of positive response of cooking job skills in students with intellectual disabilities. Furthermore, this tendency was consistently shown not only in the acquisition of cooking job skills by students with intellectual disabilities, but also in the evaluation of generalization that differentiated restaurant businesses. Through the above, this study was able to establish a meaningful functional relationship aspect between independent and dependent variables.

The limitations of this study are as follows. First, the number of participants is composed of three, so the research results cannot be generalized throughout the field of intellectual disability education. Subsequently, it is necessary to make efforts to link and develop the cases of this study into the categories of group experimental studies. Next, the aspect in which a meaningful functional relationship between the independent variable and the dependent variable could be established in this study was that the content of the dependent variable was not unconditionally required for field-oriented direct behavioral demonstration. In this study, since cooking job skills were applied to students with intellectual disabilities under the supervision and management of employer for the level of employment linkage, there was no problem with the level or quality of their contents as limitations. However, considering the validity and universalization of the intervention program composed of independent variables in this study, it is necessary to consider the level of behavioral demonstration inherent in cooking job skills. Subsequently, efforts to verify to what extent the intervention tools and procedures of this study can be effectively applied and utilized in relation to the various types

and levels of cooking job skills should also be reflected. The intervention tools and procedures of this study are expected to provide a major basis for developing from a reference level to a field-oriented level for students with intellectual disabilities to acquire cooking job skills.

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〈국문 초록〉

퀴즈기반 애플리케이션 및 연계 모방 그림그리기 활동이 전공과 지적장애학생의 조리직무기술에 미치는 효과

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[목적] 본 연구는 퀴즈기반 애플리케이션 및 연계 모방 그림그리기 활동이 전공과에 재학 중인 지적장애학생의 조리직무기술에 미치는 효과를 검증하는 데 목적을 두었다. **[방법]** 참여자는 전공과에 재학 중인 세 명의 지적장애 여학생으로 구성되었으며, 실험 환경은 전공과의 교실, 식당 사업체 내 조리실이 구성되었다. 연구 설계는 단일대상연구의 대상자간 중다간헐 기초선 설계 기법이 사용되었으며, 기초선, 중재, 유지, 일반화가 실험 조건으로 구성되었다. 독립변인은 아이패드를 통하여 퀴즈기반 애플리케이션에 구성된 여러 콘텐츠를 활용하는 절차와 모방 그림그리기 활동이 연계적으로 구성되었다. 종속변인은 떡볶이를 주요 메뉴로 하는 식당의 조리실에서 떡볶이와 튀김을 조리하는 수행으로 구성되었다. **[결과]** 연구 결과, 참여 학생들은 중재 프로그램을 통해 조리직무기술을 효과적으로 습득하고, 장소가 변별화된 일반화의 평가에 대해서도 효과성을 나타냈다. **[결론]** 이를 통해, 참여 학생들에게 적용된 독립변인과 종속변인 간의 유의미한 기능적 관계 정립과 위 결론의 시사점을 논의 및 제언하였다.

주제어 : 퀴즈기반 애플리케이션, 연계 모방 그림그리기 활동, 전공과, 조리직무기술, 지적장애

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