장애의재해석 제6권 제2호
2025 Vol. 6, No. 2, 023 - 054

Transforming Preservice Special Education Teachers' Perceptions of Twice-Exceptionality (2e) through Experiential School Design

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The recognition of twice-exceptional (2e) learners continues to grow, yet preservice special education teachers often receive inadequate preparation, which can lead to misconceptions and the under-identification of this unique population. To address this gap, this study investigated the impact of a brief, experiential school design task on 21 preservice special education teachers. Data were analyzed using repeated measures ANOVA and qualitative thematic analysis. The results revealed a significant improvement in 2e perceptions over time ($F(2, 40)=8.20$, $p=.001$, partial $\eta^2=.291$). Notably, participants shifted their focus from quantitative metrics to social-emotional traits, facilitating a reinterpretation of disability as a characteristic coexisting with potential rather than a mere deficit. Although a preference for segregated placements persisted, reflecting limited background knowledge and experience regarding 2e, the findings suggest that even brief experiential learning can effectively foster a strength-based perspective. These results highlight the need for sustained training on inclusive educational approaches specifically for 2e learners.

Keywords : Twice-exceptional students, Preservice special education teachers, Inclusive education, Perception, Giftedness

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Ⅰ. Introduction

Enhancing classroom learning requires providing students with instruction that is both supportive and responsive to their diverse needs and strengths (Tomlinson et al., 2003; Tomlinson 2014). Consequently, research and practice have long focused on exceptional learners, gifted and talented students as well as those with disabilities, whose abilities or challenges call for differentiated approaches (Individuals with Disabilities Education Improvement Act, 2004; National Association for Gifted Children, 2006). A distinct subgroup within exceptional learners is twice exceptional (2e) students (Gierczyk & Hornby, 2021; Kaufman, 2018). They belong to both categories simultaneously. Twice-exceptionality describes students who show outstanding talent or potential in one or more domains, such as intellectual, creative, artistic, or leadership, while also having one or more criteria resulting from a learning disability, ADHD, autism spectrum disorder, an emotional or behavioral disorder, a sensory impairment, or a physical disability (Reis et al., 2014). Because their strengths coexist with significant challenges, 2e students also need individualized instruction and specialized supports tailored to this atypical developmental profile (Brody & Mills, 1997).

Despite their incredible potential, identifying and supporting 2e students can be incredibly challenging. One of the biggest hurdles is the masking effect, where a student's giftedness or disability can hide or overshadow the other. For instance, a student with high cognitive abilities may develop compensatory strategies for their learning difficulties. This often results in average academic performance, masking their underlying challenges and preventing them from receiving necessary interventions. In contrast, behavioral or emotional issues tied to certain disabilities can eclipse their giftedness, causing educators to focus on remediation for the disability while overlooking opportunities to nurture the student's academic or creative talents (Assouline et al., 2010). This complexity means these students do not fit neatly into traditional categories, so they often slip through the cracks and miss out on the help they deserve. In the absence of timely identification and appropriate specialized supports,

these learners often experience academic struggles, behavioral problems, emotional challenges, and broader developmental setbacks (Morrison & Rizza, 2007).

Many educators find the concept of 2e counter-intuitive, a challenge often rooted in a lack of specific training or preconceived notions about ability. They might cling to misconceptions or stereotypes, such as the misconception that a student who struggles with reading cannot be gifted (Reis et al., 2014). Teachers also tend to focus solely on academic achievement, which makes it even more difficult to spot 2e students (Jolly & Barnard-Brak, 2024; Silverman, 2009). This issue is especially evident in the reliance on traditional testing methods. Under-identification often stems from reliance on single measures, such as strict cutoff criteria or full-scale IQ scores, because strong performance in some areas can compensate for weaker scores on certain subtests, preventing teachers from seeing the full picture of students' capabilities (Reis et al., 2014). These compensation strategies make it hard to see when many 2e students are having difficulties, which complicates how teachers respond to their needs (Assouline et al., 2010; IDEA, 2004). Ultimately, standard psycho-educational tests are inadequate in providing a comprehensive diagnostic profile for these students (Nicpon et al., 2011).

Another challenge in understanding 2e students might come from their asynchronous development. This means they are advanced in one area but delayed in another. This discrepancy can be easily misleading and complicates definition and identification (Bailey & Rose, 2011; Silverman, 2009). Considering multifaceted challenges, systematic and effective teacher training is needed. Kaufman (2018) highlighted the inadequacy of teacher training specifically related to 2e students. Due to this training gap, regular teachers might not be as knowledgeable about 2e characteristics or how to implement the necessary accommodations generally (Alsamani et al., 2023). Conversely, special education teachers often limit their perception of giftedness as outstanding talent in specific areas or creativity; they often overlook other crucial traits such as strong desire for learning, task persistence, or high levels of knowledge and comprehension (Kim & Lee, 2014). A lack of opportunities

to obtain training or information specifically related to gifted education is the cause of this limited perception among special education teachers (Minner, 1990; Kim & Lee, 2014).

Adding to these general challenges, the terminology of 2e has been an additional complication in Korean education. Researchers and practitioners have translated and adapted the concept of 2e in their own way; leading to the emergence of various inconsistent terms in both research and practice fields. For instance, terms such as jang-ae yeong-jae (literally disability gifted; 장애 영재), ijung jang-ae, (double disability; 이중 장애), ijungjeok jang-ae, (dual disability; 이중적 장애), ijung teuksu-adong, (dual special child; 이중 특수아동), and ijung yewoesong, (dual exceptionality; 이중 예외성) have been used (Gu, 2013; Jo, 2024; Kim & Lee, 2014; Kim & Kim, 2012; Song, 2011). While these English translations are literal renderings from Korean, their underlying definitions are largely consistent with established academic conceptualizations of 2e. Chowkase and Lee (2020) also noted the absence of a uniform translated terminology for 2e. This terminological inconsistency results in confusion among educators and researchers, which may hinder clear understanding and impede unified research efforts (Kim & Lee, 2014).

The strict legal divide between the Gifted Education Promotion Act and the Act on Special Education for Persons with Disabilities, Etc., in Korea results in 2E learners being overlooked by legislation. Since neither statute defines their status, teachers often exclude these students from necessary services, leaving them without clear policy guidelines (Kim & Lee, 2014).

This lack of awareness and these challenges raise concerns about the severity of the problem that 2e students may not be identified early, or even if identified, may not receive appropriate educational support, which might place them in educational blind spots (Bechard, 2019; Jolly & Barnard-Brak, 2024). Therefore, preservice special education teachers need to reflect on how their perspectives on disability and giftedness influence the setting of student selection criteria, and particularly need to examine their perceptions and educational approaches towards 2e children. This is because preservice special education teachers with such awareness can become important agents in the

actual field by recognizing the educational needs of 2e children and supporting them.

Despite this acknowledged need, it has been shown that program administrators in Korea rarely inform teachers about 2e learners during program orientations (Chowkase & Lee, 2020). Teachers in the field today, especially those in general education, frequently express that they are unprepared or do not know enough about 2e students and pertinent intervention models (Alsamani et al., 2023; Gu, 2013). The initial phases of teacher preparation are also affected by this lack of readiness. Chowkase and Lee (2020) specifically call for more practical professional development to equip preservice and in-service teachers with the skills needed to provide appropriate services for this population. Furthermore, the authors stated that a general lack of established manuals and guidelines for teachers to effectively support 2e students indicates a larger, systemic lack of structured training and specialized resources in teacher education programs.

The need for teacher training on twice-exceptionality (2e) is clear; however, traditional didactic approaches often fall short of translating into practical classroom skills. To fill this gap, the current study used a program based on situated cognition theories (Brown et al., 1989; Lave & Wenger, 1991; Putnam & Borko, 2014), which suggest that people learn best when they gain knowledge in real-life situations. In addition, reflective practice emphasizes critical reflection on action (Schön, 1983; Valli, 1997; Zeichner & Liston, 2013). It was hypothesized that preservice teachers' comprehension of 2e would become more useful if participants were immersed in an authentic, problem-based task rather than being given decontextualized information.

The intervention was organized according to Kolb's (1984) experiential learning cycle to operationalize these ideas. Participants were immersed in a complex decision-making scenario through the hypothetical school design and student selection task, which offered a concrete experience. Group discussions and written reflections prompted reflective observation, while the process of establishing school goals and selection criteria fostered abstract conceptualization, leading to new frameworks for identifying student potential.

Finally, the act of selecting students served as active experimentation. By involving participants in this organized, repetitive process, the study suggested that a deeper and longer-lasting understanding of 2e would develop than when participants received information passively.

Since there are not enough educational programs and awareness about 2e students, it is critical to create or develop a program for benefiting both teachers and 2e students. Therefore, this research is essential for examining how an experiential learning activity influences preservice special education teachers' views on twice-exceptionality in both the short and long term. This study uses a hypothetical school design and student selection task to encourage more in-depth contemplation and perspective-taking among preservice teachers.

This study focuses on addressing the following research questions:

How does the experiential learning activity influence preservice special education teachers' understanding of 2e both immediately and over time?

How does the intervention reshape teachers' rankings of the importance of key school goals?

Does the intervention shift teachers' preferred educational setting for 2e students-mainstreaming, inclusion, or segregation?

Do preservice teachers revise their student-selection criteria for hypothetical schools after completing the intervention?

Ⅱ. Method

1. Participants

In this study, twenty-one undergraduates majoring in special education participated. All participants were third-year students in the Department of Special Education at a four-year university in Korea. As shown in Table 1, the average age was 23.19 years (range: 22-27, SD=1.54), indicating most were

within a similar age group. There were twelve female participants (57.1%) and nine male participants (42.9%). Information on prior experience was collected via an open-ended question. Responses were categorized, and since participants could report more than one type of experience, the total number of coded responses (n=31) exceeds the number of participants (n=21). The majority of participants (n=19) reported prior experience in special education settings, most commonly through volunteering (n=16). A smaller number had completed a school-based practicum (n=8) or related university coursework (n=5). Volunteer activities were the most frequent type. This finding suggests that most participants likely formed their perceptions and judgments based on a certain level of background knowledge and experience with students with disabilities and special education settings.

〈Table 1〉 Participant Characteristics

(N=21)

Category		N	%
Gender	Male	9	42.9%
	Female	12	57.1%
Age	22 years	11	52.4%
	23 years	2	9.5%
	24 years	4	19%
	25 years	2	9.5%
	26 years	1	4.8%
	27 years	1	4.8%
Prior Experience	Volunteering in schools and inclusive settings	16	76.2%
	Practicum or assistant experience in school-based settings	8	38.1%
	Participated in university course work related to teaching	5	23.8%
	No response	2	9.5%

Note. Data were coded from open-ended responses. Participants could report multiple types of experience; thus, percentages exceed 100%.

2. Design

This study used a mixed-methods design to examine perceptions of giftedness, disability, and twice-exceptionality (2e). Surveys were conducted at three time points: pre-, post-, and twelve-week follow-up. Repeated measures ANOVA was used for analyzing the data. Qualitative data from open-ended and focus group responses were coded and categorized into themes.

First, participants formed self-selected groups of four to five members. Next, they designed their own hypothetical school, including a school name, educational objectives, and student selection criteria. After this initial planning phase, they were given background information on twelve potential student candidates, and participants were asked to select four students who aligned with their school objectives and criteria.

The design of this experiential task used Kolb's experiential learning cycle (Egan et al., 2023; Kolb, 1984). It suggests that learning occurs as a cyclical process, represented by the structured stages of the simulation (Wijnen-Meijer et al., 2022). The hypothetical school design and student selection task provided an opportunity for hands-on experience. Furthermore, the complex decision-making scenario immerses participants in the process of reviewing, analyzing, and selecting. The group discussions on school goals and selection criteria lead to open-ended survey questions and a concluding class conversation. The process of establishing educational goals and selection criteria for the hypothetical school promoted abstract conceptualization, leading to a new understanding of how to identify student potential beyond traditional views. Both group and individual student selection following the group discussion served as active experimentation within the simulated situation. Throughout these experiential cyclical stages, the participants were more engaged and developed a deeper understanding of 2e than they would have learned through passive information delivery.

Ethical Considerations

Although the researcher was the visiting instructor for the course, strict

ethical protocols were implemented to ensure that participation was voluntary and that responses were independent. First, students were explicitly informed that participation in the study was entirely voluntary and that choosing not to participate would have no impact on their grades or academic standing. Second, to encourage honest and independent responses, all surveys and student artifacts were collected anonymously using pseudonyms or ID numbers. Third, data analysis was conducted after the course grades were finalized to eliminate any potential bias or conflict of interest.

3. Instrument

The twelve student profiles used in this study were developed from materials created by Coil (1997). Each of the twelve student profiles was based on the documented childhood of a notable public figure, fictionalized to focus on traits relevant to the identification of exceptionality. For example, one profile was based on someone who overcame dyslexia to gain admission to Yale University through homeschooling inspired Benjamin Brown's profile.

Each student's background weaves together complex characteristics including disabilities, talents, social disadvantages, family circumstances, IQ scores, parents' education levels, health conditions, and cultural minority status. These profiles were modeled after real-life individuals, ranging from world-famous figures such as Albert Einstein, Thomas Edison, and Abraham Lincoln; others may be less familiar internationally; for example, Wilma Mankiller, who was the first female chief of the Cherokee Nation. Despite their diverse origins, their childhood stories and characteristics related to giftedness and disabilities are inspirational and universally relatable across cultures.

The objective of this activity was not to celebrate who these individuals eventually became, but rather to focus on who they were as children. The task prompted participants to recognize the students' latent abilities and imagine how a proper educational approach could help others similar to them. Ultimately, this hands-on experience offers an inspiring opportunity for preservice special education teachers, helping them develop a new

understanding of 2e students.

All profiles were provided under pseudonyms to prevent the identification of the real individuals. The profiles were provided in English, and if necessary, participants were guided to use dictionaries and internet tools to translate them.

Among these profiles, there were cases of individuals who showed clear giftedness from childhood, while there were also figures like Edison and Einstein who exhibited characteristics of 2e, and cases included individuals who, even with average academic achievement, showed strengths in areas such as diligence and social skills, thus providing participants with the experience of understanding and selecting students from various perspectives.

Providing all information, including disabilities and talents, was intentional because the study's purpose was not to assess participants' diagnostic skills. It was designed to examine how they prioritized conflicting information (e.g., low IQ scores vs. high creativity). Furthermore, keeping the students' identities anonymous until the debriefing phase was crucial. The subsequent revelation showed even the rejected students were accomplished historical figures and served as a mechanism to trigger cognitive dissonance. It forced participants to think critically about the accuracy of their initial biases and judgment criteria.

The survey was constructed for measuring perceptions of disability, giftedness, 2e, and importance of school goals. The researcher created the survey questions based on the theoretical definitions and main traits of disability, giftedness, and twice-exceptionality. The survey items were reviewed by a professor of special education with over 20 years of experience for ensuring content validity. After reviewing each survey item's clarity and relevance, the expert suggested minor revisions, which were implemented. While each subscale comprised only three items to reduce respondent fatigue, the internal consistency demonstrated strong reliability. Table 2 demonstrates that Cronbach's α coefficients varied between .706 and .918, indicating strong statistical reliability for the instrument. All items were rated on a 5-point Likert scale. Open-ended questions were also used to collect qualitative

reasons for participants' choices.

4. Procedure

This experiment was conducted during the first week of the spring 2025 semester and followed the procedure outlined below. All participants logged into an online pre-survey page, where they signed a digital consent form. After completing the pre-survey questionnaires, they were divided into self-selected groups, with each group limited to a maximum of five members.

Next, each group created a hypothetical school by setting its own educational goals and student selection criteria through group discussion. Participants then read and analyzed twelve anonymous student profiles. Each profile was a one-page summary that included information about the student's personal background, cognitive abilities, social skills, health, learning traits, and home environment.

As English was not the participants' first language, they were encouraged to use dictionaries, either physical or online, as needed. The documents used simple, clear English suitable for second-language learners.

After reviewing and discussing the profiles, each group selected four students who best matched their school's stated goals and selection criteria. Each participant made and documented their own choices in addition to the group selection. Once all groups had presented their final selections and explained their decision-making criteria, the real-life inspirations behind the virtual student profiles were revealed, followed by a class-wide discussion.

Finally, participants completed an online post-survey individually after the session. A follow-up survey was conducted twelve weeks later to measure any long-term effects.

5. Quantitative Data Analysis

The survey data was used for quantitative analysis. The data analysis used repeated measures ANOVA to compare mean scores from the pre-, post-, and

follow-up surveys. This method allows for a direct comparison of scores from the same group of participants measured at multiple points. Statistical analyses were conducted by using SPSS version 23, with significance set at $p<.05$.

In addition to the quantitative analysis, responses to open-ended survey questions were examined through qualitative content analysis. The responses were coded and categorized into themes that emerged from the data, revealing more about the participants' perspectives. These qualitative findings were used to complement and support the quantitative results.

6. Qualitative Data Analysis

Qualitative data from open-ended survey responses were analyzed using an inductive content analysis approach (Elo & Kyngäs, 2008). Considering the small sample size (n=21), data management and coding were performed manually using Microsoft Excel, which allowed for a close and immersive examination of the responses.

The analysis had three stages. First, to understand the material thoroughly, the researcher reviewed the anonymized transcripts multiple times. Second, the researcher used open coding to find common keywords and phrases, then grouped related codes into categories like Focus on Strength or Social Skills. Third, the reporting categories were combined into primary themes that reflected the participants' common viewpoints.

The emerging themes were compared with the original responses to verify that the findings accurately represented the participants' most common perspectives.

In-depth interview data were not subjected to statistical quantification. However, it provided explanatory context and underlying reasons for the trends observed in the survey results. Specifically, interview responses served as a reference for interpreting why participants showed specific shifts or reversions in their perceptions.

Ⅲ. Results

1. Impact of the Intervention on Understanding of 2e

The perceptions of disability, giftedness, and twice exceptionality (2e) were examined using three-item questionnaires. Internal consistency was assessed at the pre-test, post-test, and follow-up stages to validate the accuracy of the survey results. All measures showed excellent internal consistency throughout the test period, with reliability coefficients ranging from .706 to .918, substantially above the acceptable threshold of .70, as shown in Table 2.

〈Table 2〉 Reliability Coefficients (Cronbach's α) for the Twice Exceptionality, Giftedness Perception, and Disability Perception Scales

Scale Name	Pre-test	Post-test	Follow-up
Disability Perception	α=.790	α=.862	α=.773
Giftedness Perception	α=.706	α=.909	α=.918
Twice Exceptionality	α=.821	α=.898	α=.847

A one-way repeated measures analysis of variance (ANOVA) was conducted to determine how preservice special education teachers' views of 2e changed over time. The analysis used the average score from a three-question survey about views on 2e, which was completed before the intervention (pre-test), immediately after (post-test), and 12 weeks later (follow-up), as shown in Table 3.

Participants' average 2e perception score was M=2.86 (SD=0.57) at pre-test. This perception increased to M=3.29 (SD=0.72) at post-test and continued to slightly increase to M=3.44 (SD=0.64) at the 12-week follow-up.

Mauchly's Test of Sphericity was conducted and confirmed that the assumption of sphericity was met, $\chi^2(2)=0.83$, p=.661. The repeated measures ANOVA indicated a statistically significant change in perceptions of 2e over time, F(2, 40)=8.20, p=.001. This finding shows that the intervention effectively altered participants' understanding or views of 2e, representing a substantial

effect (ηp^2 =.291).

Bonferroni-adjusted pairwise comparisons were used to examine the nature of these changes. The results indicated that there was no significant change in participants' perceptions from the pre-test to the post-test (average difference=-0.43, standard error=0.16, p=.051). However, there was a significant increase in 2e perceptions from the pre-test to the 12-week follow-up (average difference=-0.59, standard error=0.15, p=.002). The perceptions remained consistent between the immediate post-test and the 12-week follow-up (M difference=-0.16, SE=0.14, p=.803), indicating that the change was maintained and solidified over time.

The analysis of within-subjects contrasts indicated an important linear trend with F(1, 20)=16.34, p=.001, and ηpH=.450. This finding suggests that 2e perceptions have been on a consistent upward trajectory throughout the study period. F(1, 20)=1.02, p=.326, ηp^2 =.048; no significant quadratic trend was observed.

For perceptions of gifted students, Mauchly's test of sphericity indicated that the assumption of sphericity was met, $\chi^2(2)=0.80$, p=.669. The results of the ANOVA showed that the effect of time was not statistically significant, F(2, 40) =1.25, p=.298, partial η^2 =.059. This finding indicates that the experiential school design did not affect participants' perceptions of gifted students.

When Mauchly's test of sphericity was applied to perceptions of students with disabilities, the results showed that the sphericity assumption was satisfied, $X^2(2)=2.04$, p=.360. The results showed a statistically significant effect of time on perceptions, F(2, 40)=3.22, p=.050, with a large effect size (partial η^2 =.139). Bonferroni-adjusted pairwise comparisons did not show significant differences between individual time points. However, a test of within-subjects contrasts revealed a significant linear trend, F(1, 20)=4.96, p=.038, partial η^2 =.199. The result confirms that there was a steady increase in positive perceptions regarding students with disabilities over the course of the study, but there were no significant differences between individual time points.

〈Table 3〉 Descriptive Statistics and Repeated Measures ANOVA Results for Perceptions of Twice-Exceptionality (2e), Gifted, and Special Education

Variable and Time Point	Mean	*SD*	*df*	*F*	*p*	Partial $\eta 2$
Twice-Exceptionality (2e)			2, 40	8.20	.001*	.291*
Pre Survey	2.86	0.57				
Post Survey	3.29	0.72				
Follow-up Survey	3.44	0.64				
Giftedness			2, 40	1.25	.298*	.059*
Pre Survey	3.05	0.63				
Post Survey	3.25	0.90				
Follow-up Survey	3.25	0.71				
Disability			2, 40	3.22	.050*	.139*
Pre Survey	3.33	0.60				
Post Survey	3.44	0.73				
Follow-up Survey	3.68	0.58				

*p〈0.05

Furthermore, as shown in Table 4, a similar tendency was observed in the responses to the open-ended question 'Did your understanding of disability, giftedness, and 2e change through the experiment?' 78.7% of respondents indicated that there was a perception change. Many participants mentioned a potential or strength-based perspective rather than an approach focused on students' weaknesses or needs first. Moreover, the participants recognized the necessity of inclusive education for 2e students for their academic and social experience. This finding indicates that the experiment influenced the expansion of understanding regarding the definition, concept, and broader scope of 2e.

〈Table 4〉 Changes in Understanding of Disability, Giftedness, and 2e (Multiple Coding)

Code	Meaning	Percentage	Quoted Responses
Expanded Understanding	Expansion beyond category boundaries to a potential/strength-b	40.4%	"Being gifted is not just about high IQ... If IQ is low but creativity is high, they're gifted," "Considering potential and talent beyond simple characteristics," "Students

Code	Meaning	Percentage	Quoted Responses
	ased perspective		with disabilities and gifted students are all the same target population."
Importance of Inclusive Education	Recognition that students with disabilities, gifted students, and 2e students should be educated together.	21.3%	"The importance of inclusive education increased," "Thinking that everyone is a target population for inclusive education, rather than viewing them separately."
Little Change	Minimal or no perception change	21.3%	"Seems like nothing changed," "Understanding didn't change much."
Concept Clarification	Clarification of terminology and concepts such as 2e definition and complexity.	17%	"Got a proper understanding of the 2e concept," "Considering potential, not just characteristics," "Even gifted children are not outstanding in all aspects."

To understand how preservice teachers'criteria for student selection evolved, a thematic analysis was conducted on their responses to open-ended survey questions. Participants were asked to identify the most important factor for a student's success. The data were analyzed through the six-phase procedure for reflexive thematic analysis (Braun & Clarke, 2006, 2021), as shown in Table 5. Two analysts looked at the data separately and agreed strongly on their findings (Cohen's κ=.86), leading to the discovery of the seven main themes shown in Table 5.

The analysis revealed a profound shift in how participants defined success, moving decisively away from static, traditional metrics toward dynamic, person-centered qualities. This is most starkly illustrated by the complete disappearance of IQ/Psychometric Testing as a success factor, which started as a significant criterion (17%) in the pre-survey and dropped to zero by the follow-up.

The immediate impact of the intervention was evident in the post-survey results, where the importance of behavioral observation/direct classroom watching skyrocketed from 14% to 59%, becoming the dominant criterion. After the intervention, participants placed greater value on direct and

observable evidence than students' pre-existing scores or labels.

This change in perspective deepened over time. In the follow-up survey, participants began to prioritize specific socio-emotional characteristics such as empathy, motivation, and leadership. For instance, Empathy/Compassion saw a remarkable late surge, rising from only 3% at the beginning to become the most frequently cited success factor at 41%. Similarly, other internal qualities like Leadership/Independence/Self-direction (rising to 28%) and Intrinsic Motivation/Student Will (rising to 24%) saw their most significant gains in the follow-up period.

These results show a two-stage development in the preservice teachers' perspectives. First, they learned to prioritize direct observation information over psychometric data. Second, they learned to focus on specific character-based qualities, such as empathy, motivation, and leadership, as the indicators of a student's potential for success.

〈Table 5〉 Categories of Important Success Factors When Selecting Students: Open-ended Question Analysis

Theme (codes collapsed)	Pre n(%)	Post n(%)	Follow-up n(%)	Direction of Change
Behavioral Observation / Direct Classroom Watching	4 (14%)	17 (59 %)	11 (38%)	large rise at Post, sustained
Communication & Social Interaction	6 (21%)	9 (31 %)	8 (28%)	small then plateau
Empathy / Compassion	1 (3%)	5 (17%)	12 (41%)	late surge
Intrinsic Motivation / Student Will	2 (7%)	3 (10%)	7 (24%)	gradual
Creativity / Divergent Thinking	3 (10%)	4 (14%)	6 (21%)	steady
IQ / Psychometric Testing	5 (17%)	1 (3%)	0	disappears
Leadership / Independence / Self-direction	5%	2 (7%)	8 (28%)	late surge

(Percentages are based on 29 cases denominator; multiple codes per response were allowed, so rows do not sum to 100 %.)

2. Reprioritization of School Goals

The perception score regarding the influence of school education goals on student selection significantly increased from pre-test (M=3.86, SD=0.57) to post-test (M=4.38, SD=0.67) [t(20)=-3.53, p=.002, d=.771]. This represents a large effect size (Cohen's d), meaning that through the experiment, participants gained a more concrete and practical recognition of the importance of school goals.

Consistent with this result, a similar change in perception was observed in the responses to the open-ended questions administered after the experiment: Why is the school's purpose important in the selection process? and How do you think the school's purpose influences the type of students selected and the educational experiences provided?, as shown in Table 6. Preservice special education teachers responded that the clearer the school purpose, the greater the educational effectiveness, and that this is closely linked to selection policies, curriculum operation, lesson design, school culture formation, and the direction of student growth.

These results show that preservice special education teachers came to recognize the school's educational purpose not merely as a slogan, but as the standard and foundation constituting the identity of overall educational operation.

〈Table 6〉 Reasons for and Influence of Educational Goals (Multiple Coding)

Category	Description	Percentage (Reasons)	Percentage (Influence)	Quotes
Suitability	Maximizing educational effectiveness by selecting students suitable for the school's purpose.	81%	71.4%	When students suitable for the purpose are selected, both the school and the students benefit.
Customization / Efficiency	Curriculum, lessons, and resource allocation are more efficient when the purpose is clear.	28.6%	42.9%	Providing lessons/experiences suitable for the purpose, enabling individualized customized education.

Category	Description	Percentage (Reasons)	Percentage (Influence)	Quotes
Fairness / Objectivity	Subjectivity and bias decrease when purpose and criteria are clear.	23.8%	52.9%	Subjective elements decrease, fair selection.
Community / Harmony	Sharing similar purposes and values leads to positive school atmosphere and synergy.	19%	28.6%	Harmony among students, complementary synergy.
Potential / Growth Promotion	Purpose helps students realize their potential and expand strengths.	14.3	14.3%	Expanding strengths, nurturing potential, supplementing weaknesses.

3. Shift in Preferred Educational Settings for 2e Students

Participants were asked which education settings (Mainstreaming, Inclusion, and Segregation) are the most appropriate for students with disabilities, gifted students, and 2e students. The changes were tracked by pre-, post-, and a long-term follow-up.

Preservice special educators showed a significantly higher preference for segregation regarding 2e students, with 15 participants selecting this option before the intervention. The post-intervention revealed a major shift in choice results, with only 7 participants choosing segregation. Meanwhile, 11 participants indicated they were in favor of mainstreaming. During the follow-up stage, the trend shifted once more, with 12 participants favoring segregation and 8 supporting mainstreaming (see Table 7). Inclusion was not a preferred option.

The perceptions of gifted students also fluctuated significantly. Mainstreaming was the most selected educational setting for pre- (11 participants) and follow-up (10 participants). However, inclusion emerged as the top choice after the intervention, with eight participants selecting it. Meanwhile, the number of participants who consistently selected segregation was pre-8, post-6, and follow-up-8 (see Table 7).

For students with disabilities, responses on pre-, post-, and follow-up tests

revealed a stable preference for their educational settings. A strong preference for mainstreaming largely persisted, with the number of participants favoring it changing from 13 to 11, and then to 10. Preferences for segregation remained constant at 4 participants, while the preference for inclusion showed a minor increase from 4 to 6, and finally to 7 participants (see Table 7).

〈Table 7〉 Frequencies of Educational Placement Choices by Student Group and Time Point

(N=21)

	Pre-intervention			Post-Intervention			Follow-up		
	Disability	Gifted	2e	Disability	Gifted	2e	Disability	Gifted	2e
Mainstreaming	13	11	6	11	7	11	10	10	8
Inclusion	4	2	0	6	8	3	7	3	1
Segregation	4	8	15	4	6	7	4	8	12
Total	21	21	21	21	21	21	21	21	21

4. Revision of Student-Selection Criteria

The results of comparing the final list of selected students for each group and the list of individually preferred students are shown in Tables 8 & 9. The same students, notably Benjamin Brown and Albert Einstein, were preferred in both selection types, and participants perceived that the selection criteria remained largely consistent between individual and group settings.

The 'Bibimbap School' actively excluded students with high IQs to create a collaborative environment (selecting profiles based on Thomas Edison, IQ 82; Colin Powell, IQ 90; Janet Reno, IQ not measurable; and Abraham Lincoln, IQ 110). Meanwhile, the 'Ieum School' specifically sought students with social and physical difficulties to focus on potential and need (selecting profiles based on Benjamin Brown, who had social-emotional difficulties; Einstein, who did not adjust well in school; Evelyn Cisneros, who was constantly teased; and Thomas Edison, who had no social interaction with peers).

〈Table 8〉 Group and Individual Preferred Student List

Selection Type	Preferred Student Profile
Group	Benjamin Brown(20%), Albert Einstein (15%), Ruth Ginsburg, Colin Powell, Thomas Edison, Bill Bradley, & Janet Reno (10%)
Individual	Benjamin Brown (17.86%), Albert Einstein (16.67%), Ruth Ginsburg & Bill Bradley (11.9%), Janet Reno (9.52%)

〈Table 9〉 Group Selection Criteria and Selected Students

School Name	Selection Criteria	Selected Students
Gifted School	IQ 110+, Sociability, Parental academic interest, Physical health	Benjamin Brown, Ruth Ginsburg, Evelyn Cisneros, Colin Powell
Bibimbap School	Communication skills, Almost no physical function abnormalities, Behavior not interfering with collaborative activities, IQ 〈 110	Colin Powell, Thomas Edison, Janet Reno, Abraham Lincoln
Ieum School	Lack of social skills, Potential, Will, Physical difficulties present	Benjamin Brown, Albert Einstein, Evelyn Cisneros, Thomas Edison
Concord Academy	IQ test, Teacher recommendation, Creativity, Empathy	Benjamin Brown, Ruth Ginsburg, Albert Einstein, Bill Bradley
Hanul School	Empathy, Communication, Friendliness, Low aggression	Benjamin Brown, Albert Einstein, Bill Bradley, Janet Reno

Ⅳ. Discussion

This research examined how a 90 minute experiential task creating a hypothetical school and selecting students based on participant defined goals influenced preservice special education teachers' understanding of twice exceptionality (2e). The findings yield key insights into the short- and long-term impact of this experiential intervention.

Notably, participants reported that they had not received any formal instruction for 2e students throughout their special education program. Their existing knowledge was based entirely on portrayals in popular media, such as TV shows and movies. Considering this limited background, the experiential

activity did not only change their perceptions of 2e students, but also deepened their awareness and understanding of this population's unique needs.

The lens of situated cognition explains the significant shift in perceptions of 2e, but not of giftedness or disability as separate constructs. The majority of the participants' prior knowledge regarding giftedness and disabilities was rigid. However, their understanding of 2e was forged directly within the context of the complex, problem-solving task of student selection, leading to a more profound and durable change in perception. The task made the concept real in a way that a lecture could not.

After the intervention, preservice special education teachers showed three clear changes. First, when identifying 2e students, they now privilege intrinsic motivation, social-emotional competence, and behavioral evidence over IQ or other standardized scores, explained by the power of reflective practice. By having to defend their student selections to their peers, participants were prompted to reflect on the limitations of traditional metrics. This reflection-on-action pushed them to develop a more holistic, strength-based framework for evaluation that was directly applicable to the complex profiles of 2e learners. Second, they developed a profound understanding of how a school's educational goals must structurally guide student selection and program design. Third, regarding educational placement, they showed a growing awareness of the importance of inclusive environments, even though quantitative data indicated a need for continued instruction on 2e to sustain this perspective.

These perceptual shifts can be attributed to the task's experiential design, which aligns with Kolb's (1984) learning cycle. Because the activity required teachers to examine nuanced student profiles and align their choices with explicit school goals, they were forced to reconcile rich yet often contradictory evidence. That sustained analysis displaced a disability-first mindset and fostered a strength-based view of twice exceptionality.

The shift is now visible in practice: participants favor behavior-anchored assessment tools, approach student potential from multiple angles, and began

to consider inclusive education. Together, the results illustrate how a well-scaffolded experiential task can move preservice special educators beyond passive knowledge uptake toward a durable, strength-oriented understanding of 2e and the school structures that support it.

In contrast, participants' views of disability and giftedness showed no statistically significant change, an outcome that echoes earlier findings that in-service teacher beliefs rarely shift after brief interventions (Minner, 1990). Although Minner's study focused on in-service teachers, other research shows that preservice teachers also hold distinct, often stereotypical, beliefs about giftedness and disability that form early in their own schooling and tend to remain stable (Bannister-Tyrrell et al., 2018; Baudson & Preckel, 2013). Concepts of disability and giftedness are reinforced over years of volunteering experience, formal training from the program, and broader social discourse; hence, they are comparatively rigid. Twice-exceptionality, by contrast, is still a relatively new construct in teacher education, so perceptions of 2e remain more open to revision.

First, through the experiential task, preservice special education teachers began to value qualitative assessments, such as classroom observations, student interviews, evidence of empathy, and other psychological traits, over quantitative indices such as IQ scores or course grades. This shift signals a move toward multidimensional, integrative thinking when they evaluate students.

Second, participants exhibited a marked shift in how they understood the influence of a school's educational goals on student selection. This finding aligns with Lee's (2010) argument that, as goals become more specific, teachers' judgments become more structured, clarifying what to teach, how to teach, and why. A closer look indicates that the group selection process was far more intentional and mission-oriented. The formal selection criteria developed by each group (Table 9) contrast sharply with the intuitive character of the individual selections. These nuanced, philosophy-driven rules were a direct product of group deliberation. Collaboration compelled them to translate abstract educational philosophies into concrete, actionable criteria,

making the selection process more intentional and purposeful. The preservice special education teachers likewise reported that the sharper a school's purpose, the greater its educational impact, noting tight links among admission policies, curriculum design, lesson planning, cultural norms, and students' long-term growth. They now view the school's mission not as a slogan, but as the organizing principle that shapes every facet of practice.

Third, the intervention produced only modest change in placement preferences. For students with disabilities and for those who are gifted, participants still favored mainstreaming or inclusion settings, which the literature identifies as academically advantageous for both groups. Research indicates that inclusion is beneficial for students with disabilities (Terry et al., 2018), while traditional research for gifted children often suggests segregated classes for academic excellence (National Association for Gifted Children, 2006; Shields, 2002). For 2e learners, however, most opted for segregated programs, even though recent research shows that inclusive classrooms better support 2e students' academic growth (Gierczyk & Hornby, 2021). In the context of Korea's educational environment, preservice special educators may be familiar with the mixed academic systems for disabilities and gifted students. Because the activity clarified what 2e is and highlighted individual strengths but never addressed optimal placement, participants simply transferred their prior assumptions. In-depth interviews revealed that their knowledge of 2e was often based on portrayals in popular television shows. This unfamiliarity may lead them to prefer a segregated, gifted-program approach when considering the educational needs of 2e students. In the absence of explicit guidance, many equated specialized instruction with separate classrooms. This misconception exposes a critical gap in their preparation and underscores the need to embed focused training on 2e placement policy in preservice special education programs.

Fourth, a comparison of the groups'final rosters with the students each member initially ranked most highly showed only minor discrepancies: teams ended up selecting students of roughly the same overall profile. This convergence suggests that individual value judgments and group discussion

gravitated toward a shared set of evaluation criteria. It also indicates that the collaborative task heightened participants' awareness of how selection decisions must align with stated educational goals.

One striking pattern in the data is the contrast between a classic gifted profile and the students our preservice special educators ultimately preferred. A childhood sketch of Bill Bradley typifies the traditional ideal: a reported IQ of 159, an affluent home, highly engaged parents, outstanding athleticism, leadership, empathy, high grades, creativity, and strong social skills. Bradley went on to play in the NBA and later served as a U.S. senator—an exemplary, well-rounded success story. Yet most participants chose 2e candidates instead, students such as Benjamin Brown (dyslexia) or the young Albert Einstein, whose documented IQ of 82 belied exceptional strength in mathematics and creativity.

This preference appears to stem from the teachers' special-education training: they learned to value pronounced talent that co-exists with a disability over the broad-based giftedness celebrated in general education. Kim and Lee (2014) reported a similar trend, noting that special educators give greater weight to domain-specific creativity or potential accompanying a disability. In the present study, participants likewise adopted a professional stance that recognizes and welcomes atypical profiles of exceptionality rather than the conventional all-rounder image of giftedness.

V. Limitations

While research offers substantial insights, several methodological limitations should be discussed, along with the strategies implemented to mitigate their influence on validity.

First, the absence of a control group limits the ability to attribute the observed changes to the intervention, as external maturation effects cannot be entirely discounted. However, the study employed a within-subject repeated measures design, allowing participants to serve as their controls. The

statistically significant large effect size (Partial $\eta 2$=.291) and the immediate contrast between pre- and post-test scores suggests that the changes were likely driven by the specific intervention rather than random temporal effects.

Second, the small sample size (N=21) from a single university restricts generalizability. To address this, the study adopted a mixed-methods approach to adding depth to the findings. By integrating quantitative survey data with qualitative insights from open-ended responses, the study cross-verified the statistical trends with participants' detailed narratives. This integration facilitated a more profound comprehension of the fundamental causes of the observed changes, ensuring significant applicability to analogous teacher education contexts and offsetting the constraints of limited statistical generalizability.

Third, the reliance on self-reported measures may introduce social desirability bias. To address this issue, the study analyzed not only self-perceptions but also actual group artifacts, such as the specific selection criteria presented in Table 9. The observed consistency between individual survey responses and the collaborative outputs of the group reinforces the internal validity of the findings.

Future research should broaden the sample to include preservice teachers from a variety of disciplines and incorporate a control group. In the context of 2e education, this strategy would improve the validation of experiential learning models.

Ⅵ. Conclusion

This study highlights the need for better preservice preparation on twice-exceptionality (2e), a topic largely overlooked in current teacher education programs. The results indicate that even a short hands-on activity, such as a virtual school design task in which participants created admission goals and criteria, can significantly help future teachers see the strengths of 2e students.

The same approach could benefit other stakeholders. In-service general education teachers might use a parallel simulation to recognize and support the many unidentified 2e learners in mainstream and inclusive classrooms. School leaders and policymakers could adapt the model as a springboard for school-wide identification protocols, resource allocation, and inclusive policy design for all exceptional students, including those who are twice-exceptional.

Crucially, the challenge prompted participants to redefine identification itself, giving greater weight to qualities such as intrinsic motivation and social-emotional competence instead of relying solely on test scores. While one short activity cannot replace a full program, it offers a useful and adaptable way to encourage new ways of thinking, promote a focus on strengths, and emphasize the need for inclusive practices for 2e learners.

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Abstract

경험 기반 학교 설계 활동이 예비 특수교사의 이중특수(2e) 학생에 대한 인식에 미치는 영향

안재현*

이중특수(2e) 학습자에 대한 인식이 점차 확대되고 있음에도 불구하고, 예비 특수교사들은 이에 대한 준비가 부족하여 해당 학생들에 대한 오해와 과소 판별을 초래할 수 있다. 이러한 격차를 해소하기 위해, 본 연구는 짧은 경험 기반의 학교 설계 활동이 21명의 특수교육 전공 학부생에게 미치는 영향을 조사하였다. 데이터는 반복 측정 분산분석(ANOVA)과 질적 주제 분석을 통해 분석되었다. 연구 결과, 시간 경과에 따라 2e에 대한 인식이 통계적으로 유의미하게 향상되었다 ($F(2, 40) = 8.20$, $p=.001$, partial $\eta^2=.291$). 결정적으로, 참여자들은 정량적 지표보다 사회·정서적 특성에 중점을 두게 되었으며, 이는 장애를 단순한 결핍이 아닌 잠재력과 공존하는 특성으로 재해석하는 계기가 되었다. 비록 이중특수(2e)에 대한 제한된 배경지식과 경험으로 인해 분리 배치 선호가 지속되기는 했으나, 본 연구 결과는 짧은 경험 학습만으로도 강점 기반의 관점을 효과적으로 함양할 수 있음을 시사하며, 향후 2e 학생을 위한 통합 교육적 접근에 대한 지속적인 교육의 필요성을 강조한다.

주제어 : 이중특수학생, 장애영재, 예비특수교사, 통합교육, 인식, 영재성

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논문 투고 : 2025.10.15.	논문 심사 : 2025.12.16.	게재 확정 : 2025.12.18.