education sciences

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A Preliminary Study of Satisfaction with University Mentoring in High-Intellectual-Ability Secondary Students: Instrument Validation and Association with Key Learning Processes

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Abstract

Academic satisfaction is positioned as a fundamental psychological construct with regard to academic success, linked to well-being and cognitive engagement. The aim of the study was to evaluate the satisfaction of secondary school students with high intellectual abilities (HIA) participating in the university mentoring program in the Basque Country Autonomous Community. A quantitative methodology was used with a sample of 90 students. A purpose-developed 17-item questionnaire with 17 items used to measure the different areas that make up the multidimensionality of satisfaction. The results indicate very high levels of overall satisfaction, with particular emphasis on the quality of the bond and the mentor's expertise. Likewise, through confirmatory factor analysis (CFA), the validity of the instrument was tested under the 'Big Four' model (improvement-oriented learning, individualization, feedback and practical tasks with minimal transfer). It is concluded that the mentoring program used constitutes a suitable educational response that harmonizes intellectual challenge with the psychosocial support necessary to transform potential into talent.

Keywords: high intellectual ability; gifted; satisfaction; mentoring; talent; intervention

1. Introduction

Research on high intellectual abilities (hereinafter referred to as HIA) has evolved from a static view of potential towards models of talent development that emphasize the malleability of abilities and the critical importance of the environment (Gagné, 2015; Subotnik et al., 2011; Ziegler et al., 2012). HIA may be viewed as a domain-specific developmental process in which potential transforms into achievement and eminence through the coalescing of biological, pedagogical, psychological, and psychosocial factors, requiring the deliberate cultivation of these variables to reach performance levels that are extraordinary even among high-functioning peers (Subotnik et al., 2011). Accordingly, the literature highlights the need to personalize learning processes and design educational interventions that contribute to the expression of talent. Consequently, common educational provisions for HIA students include acceleration (Steenbergen-Hu et al., 2016; Steenbergen-Hu & Moon, 2011; VanTassel-Baska, 2026) or curriculum enrichment processes (McCoach, 2003; Reis & Renzulli, 2003; Renzulli, 2012). Beyond these educational efforts, and as a pedagogical strategy, the use of mentoring has emerged. Used in other contexts (DuBois et al., 2011; Komosa-Hawkins, 2012; Larose et al., 2010, 2020; McDaniel & Yarbrough, 2016;

Academic Editors: Chua Tee Teo and Rhoda Myra Garces-Bacsal

Received: 3 March 2026
Revised: 12 May 2026
Accepted: 19 May 2026
Published: 22 May 2026

Núñez et al., 2013), the broad applicability of mentoring as a strategy to enhance students' cognitive and socio-emotional development has been observed; it is considered one of the most promising pedagogical strategies for fostering talent development, guiding students through specific mastery pathways and facilitating an effective transition from latent potential to manifest excellence (Gagné, 2015; Ziegler & Phillipson, 2012). The positive effects of mentoring are also observed in the analyses of the lives of eminent figures, suggesting that mentoring is likely to be an effective method in developing potential talents (Bloom, 1985). However, such approaches are still rarely used in educational interventions for pupils with HIA (Grassinger et al., 2010).

Despite the variety of understandings of what constitutes mentoring, studies refer to it as a stable, long-term dyadic relationship based on trust between an experienced mentor and a talented, less experienced mentee, where there is a clear intention to promote learning, development and progress in the student (Grassinger et al., 2010). The one-to-one mentor–mentee relationship constitutes an individualization of learning and the development of agency.

Scientific evidence demonstrates the benefits of mentoring in promoting intellectual, motivational, socio-emotional and academic performance levels in students with HIA (Hébert & Neumeister, 2000), and considers attention to socio-emotional needs to be a reliable indicator of future success that also correlates positively with well-being. Among the benefits of mentoring is the possibility of addressing experiences and learning that are difficult to attain in the regular school settings since the curriculum usually caters for classes of students and not to individuals. In addition, mentoring provides opportunities for the students to delve deeper into basic and specific subjects of knowledge, develop analytical skills and scientific processes, and encourage higher education, particularly among students from disadvantaged backgrounds and those who underachieve, the latter being understood as the gap between the potential indicated by the student's profile and their actual achievements (Fraleigh-Lohrfink et al., 2013; Şahin, 2025; Olszewski-Kubilius & Subotnik, 2026; Turner-Adams & Webber, 2022). It also enhances creative thinking (Şahin, 2014) and caters to the pace and depth at which students with HIA learn (Martínez-Izaguirre, 2025).

1.1. Mentoring as a Catalyst and Career Guide

In order to understand the role of mentoring, it must be considered alongside the major contemporary models of gifted education that explain how excellence arises. Examining Gagné's Differentiated Model of Giftedness and Talent (DMGT) (Gagné, 2015) and the Talent Development Mega-model (Subotnik et al., 2011) provides a robust justification for using mentoring as a means of personalizing pedagogy for students with HIA.

These models draw a clear distinction between potential—that is, natural, untrained potential—and talent, which refers to developed skills that enable transformative actions. From this perspective, high intellectual abilities (HIA) are understood as that initial potential which requires a process of development. Therefore, it is not static, but rather the result of the constant interaction between the student's potential and various catalysts (personal and environmental) that facilitate or inhibit their development. In this study, university mentors who provide personal learning serve as potential catalysts to facilitate the development of talents for HIA students in the secondary schools.

Within the DMGT framework, mentoring would be positioned as a fundamental environmental catalyst. The mentor would act not only as a knowledge provider but also as an external influence who activates and moderates intrapersonal catalysts, such as motivation and perseverance, allowing the student to maintain the necessary effort during years of practice. The Talent Development Mega-model, in turn, argues that talent follows

a trajectory that evolves from initial potential to competence and, finally, to eminence. As one progresses along this path, support needs change. While support is generalist in the early stages, mentoring becomes crucial as one approaches the expertise phase. Expert guidance is required to help find a 'personal niche' or a unique creative contribution within the professional field (Subotnik et al., 2011, 2020).

However, the reason why mentoring is a potential catalyst to guide students' progress may lie in the processes it involves (Grassinger et al., 2010). Unlike other interventions, mentoring enables the learning triad in students with HIA, intentionally articulating the interaction between the student, learning tasks and the environment. In other words, the mentor selects and sequences tasks tailored to the student's level of proficiency; promotes self-regulation and models learning content, attitudes, values, and character; provides feedback; and creates opportunities for experience (Grassinger et al., 2010; Stoeger & Ziegler, 2008). Furthermore, research in mentoring argues that for the mentor–mentee relationship to fulfill its transformative function, it must satisfy four fundamental pillars known as the 'Big Four'.

- *Improvement-oriented learning*, ensuring progressive challenges that promote the development of resilience and a growth mindset, which are key factors in talent development (Subotnik et al., 2020). This means that mentees need to have a positive learning attitude of seeking improvements and overcoming learning challenges.
- *Personalization* allows learning, its pace and depth to be adapted to the strengths and needs of students, to the asynchrony of their development, responding to what Gagné (2021) defines as the need to adjust environmental stimuli to the unique characteristics of each 'talent'. This means that mentors need to capitalize on the strengths and personally unique talents as they pace the depth and breadth of mentoring accordingly.
- Frequent, high-quality *feedback* that guides the process and provides students with the necessary information. This means that the mentor's feedback to the mentee on the process and outcomes of learning needs to be clear, precise, comprehensive and beneficial.
- *Practice tasks with minimal transfer.* The mentor guarantees access to structured practice opportunities, allowing skills to become automatic and paving the way for innovation and progress towards more ambitious achievements (Grassinger et al., 2010; Subotnik et al., 2011). This means that, other than providing the mentee with practices, the mentor needs to develop domain skills and inspire the mentee towards higher levels of achievement.

In essence, mentoring is regarded as an appropriate educational intervention given its ability to integrate the environmental support structure necessary for the transformation of potential with expert guidance required to navigate the transitions towards eminence in a particular domain, provided that it is implemented in accordance with the quality standards of effective learning processes and the four basic pillars.

Empirical studies highlight the positive impact of mentoring programs as an educational response to the specific needs of students with HIA, such as academic development (M. Kim, 2021), creative potential (Şahin, 2014), social-emotional development (Hebert, 2018; Stoeger et al., 2016), or reversing underachievement (Hébert & Olenchak, 2000).

1.2. The Importance of Personal Satisfaction in the Developmental Processes of Students with High Intellectual Abilities

Academic satisfaction has transcended its original conception as a simple measure of service quality to position itself as a fundamental psychological construct in the architecture of educational success, as a component of psychological well-being and a facilitator of

cognitive engagement. Its relevance lies in the fact that it acts as a critical determinant of academic success and the prevention of school dropout (González-Arias et al., 2025).

Self-Determination Theory (SDT) (Ryan & Deci, 2000) explains the integration of motivation and satisfaction, suggesting that the latter creates a conducive emotional state that energizes behavior towards mastery goals (González-Arias et al., 2025). Likewise, the link between academic satisfaction and personal growth initiative (PGI), which is defined as the proactive willingness to engage in one's own development (Li et al., 2024), is reaffirmed.

Academic satisfaction positively predicts both the presence of meaning in life and the search for it (Li et al., 2024). A satisfied student develops greater initiative for self-development, which strengthens their sense of direction in life. Furthermore, PGI acts as a mediator alongside career adaptability, linking current classroom experience with preparation for future challenges. Therefore, satisfaction in educational processes functions as a positive environmental catalyst.

For students with HIA, factors such as passion, perseverance, and creativity are essential personal catalysts (J. Kim et al., 2023). An environment that generates high satisfaction allows these students to maintain the state of flow necessary to avoid underachieving. Likewise, coachability, the willingness to act on constructive feedback, is enhanced by satisfaction with the teacher and the psychological safety of the environment (Salvadorinho et al., 2026). Feedback that is perceived as useful and motivating has a positive impact on learning and academic achievement (Winstone et al., 2017).

Thus, student satisfaction with mentoring depends not only on knowledge gain but also on the quality of the bond and perceived psychosocial support. Furthermore, Subotnik et al. (2020) argue that long-term success depends largely on the mentor's ability to cultivate resilience and passion. Satisfaction increases when the mentor acts as a role model who validates the student's identity as 'talented' in a specific area and helps the student to manage failure and maintain commitment to mastery (Gagné, 2021).

Studies on university mentoring programs for secondary school students indicate that students value the mentor's experience and their ability to tailor sessions to individual needs (Ibáñez García et al., 2020). Perceptions of cognitive development and emotional connection are the strongest predictors of overall satisfaction (Ibáñez García et al., 2020).

Considering the effect of satisfaction on learning, talent development and success, it appears that assessing student satisfaction is a worthy estimate of the effectiveness and potential benefits of educational interventions. Assessing student satisfaction can help determine whether the environmental stimuli are properly aligned with the characteristics of the participating students' profiles, as identified in the DMGT. Thus, satisfaction could serve as an indicator that the program functions as a positive environmental catalyst, a predictor of greater personal growth initiative (PGI), and a stronger sense of direction on the student's path to excellence.

Most studies on HIA student experiences with educational intervention programs report changes in academic outcomes (Bernstein et al., 2021; Delcourt et al., 2007) or discuss the effectiveness of the programs from the perspectives of external observers (Fernández-Molina et al., 2016), relegating the participants' own perspectives to the background. They did not report directly on their satisfaction with the program. This study addresses precisely this gap by documenting the students' satisfaction with the mentoring program at the university. Specifically, it aims to provide evidence on how a supportive environment designed by the university can strengthen the personal growth and well-being of students with HIA.

Under these premises, the general purpose of this study is to evaluate the satisfaction of students with high intellectual abilities (HIA) in secondary education in the Basque

Country Autonomous Community (CAPV) who voluntarily participate in the ZUR-EKIN university mentoring program.

This program is defined as a four-month extracurricular initiative carried out at the university that combines acceleration, enrichment, peer grouping, and career guidance in project work through six in-person sessions and online follow-up, with student participation being voluntary. This program is organized into three phases. The first phase, focused on design and outreach, includes the selection of university faculty from various departments, their training in HIA by experts, their recruitment as mentors, and the definition of projects, along with promoting the program to students. In the second phase, the mentoring is implemented, with in-person and online sessions working with students and coordination among mentors. In the third phase, the projects developed by the students are presented, and the program is evaluated.

The assessment of participating students' satisfaction addressed the following specific objectives:

- We determine the validity and suitability of the assessment tool for measuring participant satisfaction, analyzing the critical dimensions that define the quality of an educational program: satisfaction with the educational support received (mentor), methodology used, organizational structure and personal satisfaction.
- We assess the level of satisfaction reported by participants in relation to their experience in the ZUR-EKIN University mentoring program.
- We empirically ascertain the structure of the measuring instrument through confirmatory factor analysis after exploratory factor analysis, which allows for the verification of its ability to measure the 'Big Four'. The aim is to confirm whether the program guides students in learning towards improvement, personalization, high-quality or effective feedback and practice tasks with minimal transfer, which are key elements for its transformative function and talent development.

2. Method

2.1. Research Design

This study presents the results of a preliminary cross-sectional study on the satisfaction of high school students with HIA in a university setting within the ZUR-EKIN mentoring program. A new questionnaire was developed to measure satisfaction and was tested using program participants as a sample to determine its psychometric properties.

2.2. Participants

Of the 179 mentees, 90 (50.28%) responded to the satisfaction questionnaire, 28 (47.46%) in the first phase and 62 (51.67%) in the second phase. The final sample ranges in age from 13 to 17 years, with a mean (X) of 15.00 and a standard deviation (SD) of 0.95. The total sample consists of 27 (30%) females with a mean age of 14.91 (SD = 1.02) and 63 (70%) males (X = 15.03, SD = 0.93).

To ensure the representativeness of the satisfaction survey (50.28% response rate), a non-response bias analysis was conducted by comparing the respondents with the total cohort. In the first edition, no significant differences were found in gender ($\chi^2 = 0.121$; $p = 0.728$) or field of study ($\chi^2 = 1.388$; $p = 0.708$). Similarly, in the second edition, the respondent profile remained stable regarding gender ($\chi^2 = 0.167$; $p = 0.683$) and discipline ($\chi^2 = 2.407$; $p = 0.661$). These results indicate that the final sample effectively mirrors the original participant distribution, minimizing the risk of selection bias.

2.3. ZUR-EKIN University Mentoring Program

The program was structured around diverse thematic areas, including engineering, law, economics, education, sports, and psychology. Students were mentored by expert research professors who guided them through inquiry-based projects and problem-solving in real-world contexts.

The mentoring program was developed in three distinct phases over a four-month period. In the first phase, the team selected university faculty members, who received specialized training to effectively address the students' needs. During this stage, professors also defined the projects that would later be presented to the participants. The second phase involved the implementation of the mentoring itself. Once students were assigned to a project based on their interests, they participated in five sessions, supported by both in-person and online guidance through a dedicated educational platform. This phase began with an introductory welcome session designed to present the project and allow mentors and students to establish a connection. Meetings between the mentor and the mentees were held every two to three weeks, totaling five sessions. Each session lasted two hours and took place, generally, in undergraduate classrooms, although other university facilities (such as laboratories or specialized rooms) were also utilized.

Finally, in the third phase, students presented their completed projects in a closing ceremony. This final session served to share their experiences with families and the wider educational community, while also allowing for an evaluation of the program's overall impact.

2.4. Procedure

Ethics approval was first obtained from the Research Ethics Committee at the University of Deusto. Informed consent forms from parents and assent forms from students were collected prior to the commencement of the mentoring program. A total of 179 students with HIA (59 in the first phase and 120 in the second) from compulsory secondary education and upper secondary education in the Basque Country Autonomous Community participated in the ZUR-EKIN mentoring program. The students were mentored by professors from the University of Deusto with expertise in various areas of knowledge. This allowed for the creation of different thematic groups, with a total of 22 mentoring groups carried out (8 in the first phase and 14 in the second).

The mentoring program lasted four months, during which time students had access to both in-person and online support from their mentors via an educational platform. At the end of the program, students presented their projects in a final session and shared their experiences during the mentoring process with other students, families and members of the educational community.

After the mentoring program had ended, an online questionnaire was administered, with the aim of assessing the students' level of satisfaction with the development and functioning of the program. As there is consensus that satisfaction assessment should not be one-dimensional, but should cover specific dimensions of learning (self-perception of performance), interpersonal (relationships with peers and teachers), teaching (methodology) and services (infrastructure and resources) (Zhuang et al., 2025). Therefore, these were considered and factored into the design of the assessment instrument used for measurement.

Instrument

The instrument administered was a purposefully developed questionnaire designed to assess participants' satisfaction with the mentoring program. As noted, satisfaction was not approached as a unidimensional construct, but was assessed in relation to different relevant

areas in the program's process and development. The questionnaire consisted of 17 items with a five-point Likert scale, ranging from 1 (Strongly disagree) to 5 (Strongly agree).

The questionnaire assessed different areas related to the development of the program. Firstly, the structure available for the program development (infrastructure and resources) was analyzed using three items (3, 4 and 8). Secondly, the teaching methodology was evaluated using four items (9, 10, 13 and 17). Student satisfaction was also examined using five items (1, 11, 12, 15 and 16). Finally, mentor support was assessed using five items (2, 5, 6, 7 and 14).

2.5. Data Analysis

A quantitative, descriptive, cross-sectional research design was employed. The analysis focused on examining frequencies and measures of central tendency to assess students' satisfaction levels across various dimensions, and the robustness of the findings was ensured through an analysis of the reliability and validity of the measurement instrument used.

In order to verify the suitability of the instrument for assessing the different areas of student satisfaction, a confirmatory factor analysis (CFA) was carried out. The CFA was also used to determine whether the instrument allowed for the assessment of the four pillars mentioned above (improvement-oriented learning, personalization, feedback, and practice tasks with minimal transfer). R (version 2025.09.2+418) was used to perform the CFA, using the Lavaan package, 0.6/20 and 0.5/7 (Rosseel, 2012). In turn, the semTools package (Jorgensen et al., 2025) was used to calculate the omega coefficients of the different factorial dimensions. IBM SPSS Statistics (version 27) (IBM Corp., 2012) was used for the central tendency and dispersion analyses.

In order to verify the adequacy of the models, different fit indices were used, including absolute fit indices such as chi-square in relation to degrees of freedom (ratios less than 3 indicate a good fit), SRMR (values less than or equal to 0.08 indicate a good fit), RMSEA (cut-off point set at 0.06), together with the GFI and AGFI (in which a value close to 0.95 indicates a good fit). In turn, the CFI and TLI are used as comparative fit indices (a value close to 0.95 indicates a good fit) (Abad et al., 2011).

3. Results

A descriptive analysis of the central tendency and dispersion of the items comprising the questionnaire was performed, including the response frequencies of the participants. Table 1 shows that, overall, the mean score for the items is high, ranging from 4.15 (item 15) to 4.74 (item 2). In contrast to the general trend, item 3 has a considerably lower mean, accompanied by the highest standard deviation (X = 3.15; SD = 1.25). These values indicate a high degree of heterogeneity in responses among participants, suggesting a lack of consensus regarding the adequacy of mentoring hours and highlighting this point as an area for improvement within the program.

Table 1. Descriptive analysis of items.

Item		X	SD	Sk	K	1	2	3	4	5
1.	These mentoring sessions have met my expectations.	4.22	1.01	−1.49	2.03	3.4	3.4	11.1	31.5	50.6
2.	The mentor's knowledge of the subject matter has been adequate.	4.74	0.72	−3.76	16.11	2.2	0.0	2.2	12.4	83.1
3.	The number of hours spent has been appropriate.	3.15	1.25	−0.10	−1.06	10.1	24.7	21.3	28.1	15.7

Table 1. *Cont.*

Item		X	SD	Sk	K	1	2	3	4	5
4.	The objectives of the mentoring program have been clearly set out.	4.49	0.96	−1.49	2.46	3.4	2.2	11.2	38.2	44.9
5.	The training provided by the mentor has enabled me to carry out the tasks and exercises set.	4.47	0.88	−2.11	4.89	2.2	2.2	5.6	25.8	64.0
6.	The guidelines for implementing the mentoring scheme have been clear and have been helpful to me.	4.30	0.93	−1.59	2.60	2.2	3.4	9.0	32.6	52.8
7.	I have been able to share my concerns and views with my mentor and received a satisfactory response from them	4.60	0.85	−2.53	6.77	2.2	1.1	6.7	14.6	75.3
8.	Both the venue and the facilities for the mentoring sessions have been good.	4.58	0.78	−2.78	9.53	2.2	1.1	1.1	27.0	68.5
9.	The teaching methods used in the mentoring sessions have been effective in achieving the stated objectives.	4.38	0.92	−1.99	−1.99	3.4	1.1	6.7	31.5	57.3
10.	Participation and collaboration have been encouraged.	4.29	0.94	−1.45	−1.45	2.2	2.2	13.5	28.1	53.9
11.	I am satisfied with the mentoring process.	4.46	0.83	−1.91	−1.91	1.1	3.4	4.5	30.3	60.7
12.	I would recommend this mentoring program to other gifted students.	4.56	0.82	−2.50	−2.50	2.2	1.1	4.5	22.5	69.7
13.	The methodology adopted has been appropriate	4.37	0.87	−1.86	−1.86	2.2	2.2	5.6	36.0	53.9
14.	The mentor communicates clearly/The mentor communicates in a way that is easy to understand.	4.72	0.64	−3.14	−2.83	1.1	0.0	3.4	16.9	78.7
15.	I have found the mentoring sessions inspiring.	4.15	1.04	−1.42	−1.42	3.4	6.7	6.7	38.2	44.9
16.	I feel that I have learnt about the topics covered in the mentoring sessions.	4.36	0.93	−1.90	−1.90	3.4	1.1	7.9	31.5	56.2
17.	The objectives set for the chosen specific mentoring program have been met.	4.29	0.99	−1.70	−1.70	3.4	3.4	7.9	31.5	53.9

Note. X: mean; SD: standard deviation; Sk: skewness; K: kurtosis. Original items in Spanish.

When assessing student satisfaction levels, average scores were calculated by dividing the sum of the items by the number of items, both for the overall scale and for each of the dimensions designed in the test. Regarding the overall scale, an average satisfaction of

4.34 (SD = 0.68) was observed. Although this result provides an overview of the degree of satisfaction, it is not appropriate to analyze this construct in a one-dimensional manner, as previously noted. Therefore, it was considered relevant to examine the different dimensions proposed.

All four dimensions evaluated received high average scores, indicating an adequate level of satisfaction. In particular, the following results were obtained: relationship with mentors (X = 4.57; SD = 0.70), student experience (X = 4.35; SD = 0.78), methodology used (X = 4.33; SD = 0.78) and infrastructure used (X = 3.97; SD = 0.70). Overall, the four dimensions reflect a high level of satisfaction among students. Of particular note is the assessment of the relationship with mentors and the work they carried out, while the infrastructure, although slightly lower on average than the other dimensions, still shows an adequate level of satisfaction.

Given the lack of normality of the items, the high values of skewness and kurtosis, and considering that these are ordinal data from a 5-point Likert scale, it was decided to use the WLSMV method (Flora & Curran, 2004) as the estimator in the confirmatory factor analysis (CFA).

When performing factor analysis, two models are tested, using all of the items developed. The first model examined was the 'original' model, initially designed to evaluate the areas considered most relevant within the mentoring process (mentors, students, structure, and methodology). The second model is developed considering the dimensions of the 'Big Four': *improvement-oriented learning* (1, 6, 10, 16 and 17); *personalization* (1, 3, 5, 8, 9, 11, 12 and 13); *feedback*: (7 and 14); *practice tasks with minimal transfer* (15). Since the 'Practical Tasks with minimal transfer' dimension consists of a single item (item 15), it was decided to treat it as an observed variable in order to avoid compromising the theoretical integrity of the Big Four model. To this end, the approach proposed by Petrescu (2013) was followed, assuming a reliability of 0.85 for the item, given the impossibility of calculating it directly, and following the author's recommendations for single-item constructs. Consequently, the error variance was set at 15% of the observed variance of the indicator.

As shown in Table 2, both models fit the data well. The GFI, AGFI, CFI, and TLI indices show optimal values in both models. Regarding RMSEA, the original model has an excellent value (0.000) with an adjusted confidence interval (0.000–0.038), while the model based on the Big Four shows a slightly higher value (0.034; CI 0.000–0.066), although it remains within ranges considered optimal. Meanwhile, the SRMR is acceptable in both cases (0.065 and 0.070, respectively). The fit for the original model was excellent, although the exceptionally high fit indices (CFI/TLI ~1.00) should be interpreted with caution given the sample size and model complexity. Overall, although the original model exhibits a marginally better fit on some indices, both models can be considered well-fitted and appropriate for the analyzed data.

Table 2. Model adjustment indices.

	χ^2	df	χ^2/df	GFI	AGFI	CFI	TLI	SRMR	RMSEA	LL	UL
Original	100.94	113	0.89	0.992	0.986	1.000	1.001	0.065	0.000	0.000	0.038
Big Four	120.13	113	1.06	0.991	0.984	0.999	0.999	0.070	0.027	0.000	0.062

Note: χ^2: chi-square; df: degrees of freedom; χ^2/df: chi-square/df ratio; LL and UL: lower and upper limits of the RMSEA confidence interval.

Table 3 presents the standardized factor loadings of the items for the two models tested, together with the variance explained by the item for each dimension and the omega values.

Table 3. CFA results for the original and Big Four models.

Original Model					Big Four Model							
Dim.	**Item**	**λ**	**R2**	**ω**	**Dim.**	**Item**	**λ**	**R2**	**ω**	**Item**	**Ori.**	**B.F.**
Mentor	Q2	0.953	0.907	0.911	IOL	Q4	0.762	0.581	0.899	Q1	0.840	0.830
	Q5	0.862	0.742			Q6	0.870	0.757		Q2	0.953	0.922
	Q6	0.903	0.815			Q16	0.887	0.786		Q3	0.337	0.317
	Q7	0.896	0.802			Q17	0.893	0.797		Q4	0.818	0.762
	Q14	0.835	0.696			Q10	0.654	0.428		Q5	0.862	0.832
Mentee	Q1	0.840	0.706	0.898	Person.	Q2	0.922	0.850	0.893	Q6	0.903	0.870
	Q11	0.903	0.815			Q9	0.826	0.682		Q7	0.896	0.954
	Q12	0.820	0.672			Q13	0.817	0.668		Q8	0.525	0.492
	Q15	0.780	0.608			Q1	0.830	0.688		Q9	0.821	0.826
	Q16	0.899	0.808			Q3	0.317	0.101		Q10	0.648	0.654
Method	Q9	0.821	0.674	0.809		Q8	0.492	0.242		Q11	0.903	0.895
	Q10	0.648	0.420			Q5	0.832	0.693		Q12	0.820	0.806
	Q13	0.810	0.655			Q11	0.895	0.800		Q13	0.810	0.817
	Q17	0.878	0.770			Q12	0.806	0.650		Q14	0.835	0.871
Structure	Q3	0.337	0.114	0.505	Feedb.	Q7	0.954	0.910	0.847	Q15	0.780	1.000
	Q4	0.818	0.668			Q14	0.871	0.759		Q16	0.899	0.887
	Q8	0.525	0.275		Practice	Q15	1.000	-	-	Q17	0.878	0.893

Note. λ: factor loading; ω: omega value; Ori.: original model; B.F.: Big Four model; Method: methodology; IOL: improvement-oriented learning; Person.: personalization; Feedb: feedback; Practice: practice tasks with minimal transfer.

The factor loadings in both models were generally high, mostly falling within the range of 0.80–0.90. These loadings indicate that the items have a high explanatory power with respect to their dimensions, contributing a significant amount of shared variance. This finding confirms the consistency of the analyzed models and demonstrates that the selected indicators are representative of the theoretical constructs under evaluation. As an exception, items 8 and 10 have more moderate loadings, although they are still considered acceptable. Item 3, on the other hand, has an unsatisfactory factor loading, suggesting that while the item captures a relevant practical aspect (mentoring duration), its low factor loading reflects the high variability in students' perceptions regarding time adequacy. In the model based on the Big Four theory, item 15, being the only one that makes up the practice tasks with minimal transfer dimension, leads to an under-identified factor. To improve the measurement of this dimension, it would be advisable to add more items that adequately represent it.

When assessing internal consistency using the omega coefficient, the values obtained are good or excellent in the original model, except in the structure dimension, where a poor value is recorded. This situation is related to the presence of item 3, which has the lowest factor loading, and item 8, with moderate loading, considering that this dimension only has three items. In the Big Four model, the omega values calculable for the three available dimensions were good. For the fourth dimension (practice tasks with minimal transfer), as it consists of a single item, it is not possible to calculate internal consistency; therefore, as mentioned, it is necessary to increase the number of items that comprise it.

4. Discussion

The study has confirmed the suitability of the instrument and its ability to assess students' perceptions of the key dimensions of educational quality of the ZUR-EKIN university mentoring program for students with HIA, such as the educational support received from the mentor, the methodology used, the organizational structure and personal

satisfaction. In addition, it has facilitated the analysis of the level of satisfaction of the students with HIA with the mentoring program. It appears that the program's quality in terms of students' satisfaction is somewhat aligned with the pillars of improvement-oriented learning, personalization and feedback.

Both models show adequate fits, satisfactory loadings of most items and high reliability, with the model on educational quality of the mentoring program being slightly superior, as the 'Practice tasks with minimal transfer' pillar of the Big Four model was composed of only a single item. Additionally, the low factor loading of item 3 in both models suggests that its relevance within the scale should be reviewed in terms of theoretical pertinence. Future studies may remove item 3. It indicates that the number of hours of mentoring was perceived as less adequate. This could be associated with the structural constraint of the program and attributed to the fixed schedule in school and university hours, as compared with HIA students' needs for individualized pace.

4.1. Level of Satisfaction with the University Mentoring Experience

The results obtained reveal a high level of satisfaction among students with HIA regarding their mentoring experience in the ZUR-EKIN program. These results should not be interpreted as a mere indicator of satisfaction, but rather as a positive finding, given the connection between educational satisfaction and educational success, psychological well-being, and cognitive engagement (González-Arias et al., 2025).

This satisfaction suggests that the mentoring program may have helped to establish a favorable emotional state that drives improvement, commitment and self-growth (Hebert & McBee, 2007), validating the student's identity and strengthening their cognitive commitment. By acting as a 'positive environmental catalyst' (Li et al., 2024), the benefit derived from the group format of mentoring is particularly relevant. The high level of satisfaction in this collective context suggests that participants perceive that the program has not only addressed individual cognitive development, but has also mitigated the social isolation that is common in this group. By interacting with peers who share similar interests, academic satisfaction is linked to the creation of support networks and social capital (Stoeger et al., 2017), where the shared experience of intellectual challenge reinforces the sense of belongingness. The value of this network in facing academic and personal challenges with greater confidence and resilience is also noteworthy (Phelan et al., 2022). Given the variability observed in item 3, which is the program's duration, consideration should be given to evaluating both the number of sessions and their duration in future editions, so that the program's design can address students' needs.

The findings appear to indicate that a university mentoring program could help foster the harmonization of social bonds, personalization and group exchange (Ibáñez García et al., 2020) when the needs of HIA students are met.

4.2. The Big Four in University Mentoring Programs

Findings with the Big Four model appear to imply an optimization of the learning process in mentoring. With regard to improvement-oriented learning, satisfaction is directly linked to clarity in structure and objectives (Item 4) and the constant support received (Item 6). These results suggest that the mentor has succeeded in moderating the student's intrapersonal catalysts, transforming the task into a source of personal achievement (Item 16) and methodological satisfaction (Item 17). The fact that collaborative spaces (Item 10) have been positively evaluated reinforces the idea that intellectual challenge, when shared in a supportive environment, enhances the sense of competence (Phelan et al., 2022).

The dimension of personalization emerges as one of the most robust pillars of the study. The correspondence between the methods used (items 9 and 13) and the personal

expectations of the students (item 1) confirms that the educational response has been successfully adjusted to the asynchrony and uniqueness of the diverse profiles of the HIA participants. The adequate estimation of time and space (Items 3 and 8), alongside the perceived competence of the mentor (Items 2 and 5), has generated such a satisfactory experience (Item 11) that students actively recommend it to other peers (Item 12), consolidating the intervention as a model of equity and effectiveness.

Finally, frequent feedback and practical, transferable tasks appear to contribute to perceived effectiveness. The confidence to voice concerns and the mentor's clear communication (Items 7 and 14) have established the psychological safety necessary for feedback to act as a driver of improvement. This dynamic, combined with the perception of mentoring as a stimulating experience (Item 15), leads to learning being perceived not only as an academic process but as a tool for growth with the capacity to make a real impact. However, it must be acknowledged that the 'Practice tasks' pillar represents a significant limitation in this study, as it relies on a single item (Item 15). Consequently, this item serves only as a proxy for the construct, included to maintain the theoretical integrity of the 'Big Four' model. Future research should prioritize the development of a multi-item scale specifically designed to capture the complexity of this dimension more accurately.

Nevertheless, university mentoring programs have the potential to help develop technical skills in specific areas and facilitate the psychosocial development of students with HIA, enabling them to aim for significant creative contributions and higher levels of personal satisfaction (Subotnik et al., 2011; Grassinger et al., 2010).

In short, the results are consistent with the literature (DuBois et al., 2011); however, it should be noted that not all mentoring programs yield statistically significant benefits (Wood & Mayo-Wilson, 2012). The results are better when mentors and mentees with similar interests are matched, and there is also alignment between the mentors' professions and the specific goals of the mentoring program (DuBois et al., 2002, 2011).

5. Conclusions

The study conducted has piloted a tool that assesses the satisfaction of students with HIA participating in university mentoring programs, and the aspects that can make this educational initiative an enriching experience for students with HIA, as the instrument has proven effective in measuring the aspects recognized as essential to the quality of educational programs and allows for the analysis of the Big Four processes (focus on improvement, personalization, feedback, and practice).

The study contributes to the consideration of university mentoring as a positive environmental catalyst, guiding students through their talent pathway. Therefore, it is seen as a potential educational strategy to be implemented in secondary education, aimed at fostering intellectual development, self-confidence, and a support network that enables students to achieve significant and transformative accomplishments in adulthood.

5.1. Limitations

However, this study also has certain limitations. One of them is that its cross-sectional and descriptive nature prevents us from establishing causal relationships between student satisfaction and the effective development of their talent. The results reflect participants' perceptions at a specific point in time; longitudinal or experimental studies with control groups would be needed to confirm whether this satisfaction translates into transformative long-term achievements.

The possibility of self-selection bias should also be considered, given that the response rate was 50.28%. The fact that the questionnaire was administered online after the program ended may have encouraged participation among more motivated or satisfied students,

which could lead to an overestimation of satisfaction levels. In addition, the satisfaction reported by the students could be due to a positive response bias. However, a comparative analysis between respondents and non-respondents showed no significant differences in terms of gender or field of study, suggesting that the final sample is representative of the total cohort. Nevertheless, future research could benefit from higher response rates to further minimize any potential bias.

Furthermore, the study has limitations regarding the representativeness of the sample, due to the predominance of male participants (approximately 70% compared to 30% female). This disparity limits the ability to generalize the results to the total population of students with HIA. This difference in participation is not arbitrary but reflects the existing gender bias in the detection rates for this group. Highly gifted girls tend to be identified to a lesser extent or at a later stage, which limits their access to enrichment programs and, consequently, their representation in research of this nature—an aspect that emerges as a subject of study and an area for future research.

On another note, the limitations of the instrument development process must be acknowledged. Although the questionnaire underwent an internal peer review by specialists in the field, no formal external validation—such as the Delphi method or a preliminary pilot test—was conducted due to the specificity of the sample and the difficulty in accessing it. Nevertheless, it should be noted that the confirmatory factor analysis (CFA) conducted in this study not only validates the proposed theoretical model but also constitutes a significant contribution to the construct validity of the instrument for use in similar contexts.

As previously mentioned, the 'Practice tasks' factor consists of a single item (item 15), which represents a significant limitation for both its theoretical representation and the validity of the model. Consequently, it is necessary to develop additional items that allow for a more in-depth measurement of this factor and achieve a complete representation of the model.

Another limitation of the study lies in the quantitative design used. While this approach facilitates the generalization of results and an objective description of the phenomenon, it limits the ability to delve into students' subjective experiences and the nuances of their qualitative insights. The absence of qualitative items prevents an exploration of the reasoning and motivations underlying the ratings obtained in the satisfaction questionnaire. This lack of narrative depth limits a comprehensive understanding of the students' experience, suggesting that a future line of research should adopt a mixed-methods approach that triangulates statistical data with qualitative techniques to address these shortcomings.

5.2. Future Research

Looking ahead, it would also be worthwhile to analyze satisfaction levels among students who continue to participate in mentoring programs, in order to determine whether extending the program over time can amplify its benefits. Likewise, it would be appropriate to conduct a longitudinal follow-up of participating students and compare them with a control group that has not participated in mentoring programs, in order to understand how mentoring may influence their academic performance and career paths. Furthermore, to improve participant response rates and reduce potential self-selection bias, future research should consider implementing incentive strategies or administering questionnaires in person during the program's sessions. Such approaches would decrease reliance on post-program online surveys, thereby fostering a more comprehensive and representative data collection process.

Author Contributions: Conceptualization, M.M.-I., J.P.-S.J. and A.Á.-G.; methodology, A.Á.-G.; Software, A.Á.-G.; validation, A.Á.-G.; formal analysis, A.Á.-G.; investigation, M.M.-I.; resources,

M.M.-I.; data curation, A.Á.-G.; writing—original draft, M.M.-I., J.P.-S.J. and A.Á.-G.; writing—review and editing, M.M.-I., J.P.-S.J. and A.Á.-G.; visualization, J.P.-S.J. and A.Á.-G.; supervision, M.M.-I., J.P.-S.J. and A.Á.-G.; project administration, M.M.-I.; funding acquisition, M.M.-I. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Basque Government, no specific number.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board at National Taiwan Normal University on 16 December 2024 (ETK-14/24-25).

Informed Consent Statement: Written informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available upon request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

HIA	High Intellectual Ability
CFA	Confirmatory Factorial Analysis
DMGT	Differentiated Model of Giftedness and Talent
SDT	Self-Determination Theory
PGI	Personal Growth Initiative
CAPV	Basque Country Autonomous Community

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