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The role of diversity in enrichment programs in shaping the career paths of gifted individuals: An analysis of influential factors and emerging trends

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ABSTRACT

This study investigated the impact of enrichment programs on the career development of gifted Saudi students using a descriptive-analytical approach with a survey of 415 university students and graduates. Results indicated that 91.81% of participants recognized enrichment programs as essential for shaping career goals, with 91.23% favoring quality-focused over quantity-based programs. Key influencing factors included alignment with labor market needs (mean = 4.71), exposure to diverse fields (mean = 4.50), and expert involvement (mean = 4.41). The findings highlighted a strong positive relationship between program diversity, structured design, and career clarity, underscoring the need for purposeful educational initiatives that respond to industry demands. The study recommends expanding programs with AI-based career guidance, strengthening educator training for personalized counseling, and conducting regular program evaluations, thereby supporting educational and policy development in line with Saudi Vision 2030.

1. Introduction

Enrichment program diversity, as defined in this paper, is the intentional representation of cultural, cognitive, and socio-economic facets in program planning to maximize developmental experiences of gifted learners. The construction has its foundation upon the consistently recognized gifted education theories (Gagné, 2004; Renzulli, 2012; Subotnik et al., 2011) and currently relates to the emerging knowledge of the association between enrichment diversity and professional identity development as well as inclusive education (Subotnik et al., 2018; Hébert, 2021; Plucker and Peters, 2020). Self-efficacy, motivation, and better-defined career goals develop when students are exposed to multicultural experiences as part of enrichment experiences, especially in equitable program designs (Grantham, 2012; Dai, 2020). In recent views, the significance of the shifting views towards diversity as vehicles of policy reshaping and talent-building approaches is covered (Napier et al., 2024), which makes it clear that the implementation of inclusive models of multifactor intelligence needs to happen. Empirical research also indicates that problem-solving, cognitive complexity, and adaptive resilience improve enriching environments, which ensure students are strategically positioned in handling intricate career paths (Ziegler and Phillipson, 2012). The convergent method enables the combination of the discourses of enrichment diversity, gifted education theories, AI-backed career counseling, and cross-cultural programming, eliminating the conceptual divide that previously existed and facilitating a consistent relation to the goals of the study and the Vision 2030 in Saudi Arabia.

The current research is a new combination of enrichment frameworks of diversity with AI-based career counseling that has seen little representation in historically published literature on gifted education. This model, contextualized to the context of the Vision 2030 of Saudi Arabia, provides the research with a culturally based approach with global application in connecting technological innovation to socio-educational diversity. The gaps in the research identified are filled using the framework, which combines the idea of cross-cultural enrichment with the new tendencies concerning big data, gender inclusivity, and AI-powered directions. This direct definition of novelty is what makes the given study stand out from other studies that were aimed more at the cognitive or

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psychosocial outcomes. The common paradigm in giftedness assessment hitherto has been largely on test-oriented measurements with little or no regard paid to the role of culture and environmental setting in the identification and nurture of talent. Inclusive gifted education has prompted the concept of integrating perspectives as the diversity in marked concepts is to be an imperative in equitable educational practice and the correct identification of gifted potential. When the overall goal of the enrichment program, intended to meet cultural and socio-economic diversity, is pursued, in addition to addressing the diverse learning styles, it helps promote a sense of belonging and proves to be culturally affirmative to marginalized students. Despite these exciting findings, we still lack uniform methods of integrating diversity into enrichment models or even identifying the parameters under which diversity will bolster or stall the intellectual development of gifted students (Delgado-Valencia et al., 2025).

Structural disparities, like subconscious prejudice during identification practices and funding shortages, and even culturally uninformed teaching practices, remain constraints towards engagement across diverse gifted groups of learners. It is important to counter these obstacles to promote equity, empowerment of the self, and further advancement of professional lives. The existing study refers to addressing the limitations of both foundational frameworks and authentic student engagement as a way to bridge between psychology, educational, and career development theories.

The development science highlights that there exists a dynamic relationship between personal traits and the surrounding conditions in the development of career paths. The gifted with an early profile also receive sustained enrichment, which builds self-efficacy and goal setting as components of the social cognitive career theory (García-Martínez et al., 2021). Diversity-focused enrichment enhances career exploration awareness and serves as a positive role model, and has come to benefit specific groups that are underrepresented in the scope (Al-Zoubi, 2014). These habits also disrupt the conventional career paths and foster the delivery of fair educational outcomes.

Though there is an increasingly higher awareness of the role of diversity in the development of giftedness in career development, there has been very little empirical evidence on long-term effects. Available literature shows that exposure to a variety of learning environments increases the ability to adapt, resilience, and career satisfaction (Rutledge and Gnilka, 2022). Nevertheless, the limited availability of longitudinal studies monitoring changes during the development proves the necessity to conduct further research. Filling this gap is essential to policymakers, to the enrichment process, and the ability of the gifted student to survive the increasingly complex career paths.

Although enrichment programs aim to develop gifted students' talents, these programs fail to simplify career path determination. These programs generate continuing uncertainty as to how they influence students' professional destiny decisions. The fast-changing work environment, together with the need for new abilities, including artificial intelligence and computational reasoning, requires enrichment programs to extend their boundaries from conventional formats. Career counseling results can be enhanced by AI-enabled large language model support for guidance and reasoning purposes (Sivarajkumar et al., 2024).

The decision-making process using structured reasoning methods shows effectiveness through chain-of-thought prompting and retrieval-augmented generation. The integration of creative models within career counseling brings better personalization to students when educational institutions implement prompt optimization frameworks designed to mimic human thought patterns. Careers guidance receives scalable, context-sensitive interventions through AI-driven support systems, which apply adaptive prompt strategies.

This study seeks to fill the existing gap in research about the main subject matter. The research uses surveys with 415 gifted students from both genders to understand their opinions about the topic. The research investigates gifted students in Saudi Arabia through the main inquiry: What role does enrichment program variety play in influencing career directions for these students?

This primary research question is further divided into the following sub-questions

1. What is the impact of enrichment program diversity on shaping the career paths of gifted students?
2. Is there a correlation between the type of enrichment programs that gifted students have benefited from and the career path they have chosen?
3. How does the number of enrichment programs attended by gifted students influence the clarity of their career path?
4. What are the most influential factors in enrichment programs that contribute to career path determination from the perspective of gifted students?

The research examines how diverse enrichment programs influence the career development paths of gifted students across the Kingdom of Saudi Arabia through the following objectives:

1. Examining the impact of enrichment program diversity on shaping the career paths of gifted students.
2. Investigating the correlation between the type of enrichment programs attended by gifted students and their chosen career paths.
3. Assessing the effect of the number of enrichment programs on the clarity of gifted students' career paths.

4. Identifying the key factors influencing enrichment programs in career path selection from the perspective of gifted students.

The study uses social cognitive career theory to build a new gifted education theory through empirical data about enrichment program variety and career development. The theory breaks outdated theoretical models of giftedness, which base assessment only on intelligence, by showing how different learning experiences create self-efficacy and vocational identity and goal formation abilities. This study broadens the "diversity" concept by including intellectual and knowledge-based variables along with technology variables, which deliver an extensive theory framework. The research collects Saudi Arabian regional information to present culturally grounded insights that strengthen universal knowledge of enrichment programs operating outside Western societies. This localized method uses regional knowledge to enhance current models regarding socio-economic and cultural elements that shape talent growth and career preparation.

The study delivers useful recommendations for educational policymakers and program designers and institutional leaders who operate under Saudi Vision 2030. Research data demonstrates why institutions should expand enrichment programs, so they become compatible with current workforce requirements and international employment patterns. AI-guided career advice, along with expert teaching and cross-disciplinary training, is essential to achieve personalized education that addresses market suitability according to study results. Structural elements, including program availability alongside the standard and matching scope of career counseling and student interest-based learning, all directly influence both students' career direction and their future achievements. Research data support the creation of future-oriented, inclusive educational methods that develop personal talent and expand human capital alongside social equality in Saudi Arabia, along with other relevant cultural settings.

1.1. Core concepts

- Enrichment Programs: Educational interventions for gifted students include both advanced knowledge acquisition and new academic fields, which support their individual learning requirements (Olszewski-Kubilius and Thomson, 2015).
- Diversity of Enrichment Programs: The concept extends to different kinds of challenging educational programs that boost gifted students' learning abilities across multiple subject areas. Diverse educational opportunities strongly affect career selection because students gain an understanding of their talents alongside their areas of interest.
- Giftedness: The understanding of giftedness differs across cultures since societies embrace unique sets of values (Subotnik et al., 2011). Students who qualify as gifted through the Mawhiba Cognitive Abilities Tests are them at different educational levels based on the nomination pathways in Saudi Arabia.
- Talent Development: The structured process supports gifted individuals' capabilities by intertwining their potential with their personal interests and domains (Garavan et al., 2012).
- Career Path: A career path represents the continuous evolution between different jobs and professional abilities in a selected field, which results from personal interests together with individual capabilities, and formal education. Enrichment programs serve gifted students by providing both exposure to various fields and complicated skills, which lead them to make better career choices grounded in comprehensive cognitive and experiential grounding.

2. Literature review

A synthesized review of ten empirical and theoretical investigations highlights the multifaceted impact of enrichment programs on gifted students' cognitive, creative, and professional development. Rather than describing each study in isolation, this integrated narrative groups research thematically to clarify converging findings, theoretical underpinnings, and gaps that inform the present study's framework.

Literature shows that the enrichment initiatives increase analytical ability, creative problem solving and independence of intellect. Research works like VanTassel-Baska (2006) and Ziegler and Phillipson (2012) demonstrated that the project-based and multicultural approaches cultivate the thinking of higher orders that adhere to the Theory of Successful Intelligence and Creative Problem-Solving model by Sternberg (Al-Zoubi, 2014; Reis et al., 2021). These results confirm the importance of enrichment as a way of developing talents beyond the established academic standards, as is also echoed by the early work of Hoops in project-based learning.

Enrichment programs are also the determining factors regarding occupation and career direction. According to the findings of Lubinski and Benbow (2006), Skovholt et al. (2001), and Betts and Neihart (1988), rigorous career counseling that is incorporated into enrichment modes correlates personal interests that students have with the career one may take later in life, which results in better decision-making in life and leadership ability. Ziegler and Phillipson (2012) also discuss the role of enrichment that focuses on leadership in promoting an identity, as an indirect concept in cognitive development, with a reference to the vocational desires.

Studies exploring motivation reveal the interplay of external and internal drivers. Visessuvanapoom et al. (2024) reported that STEM-oriented students rely heavily on family and institutional support, while Napier et al. (2024) found that gifted girls often draw

motivation from intrinsic beliefs and self-concept. These contrasting findings illustrate the nuanced influence of sociocultural factors yet underscore an enduring gap: most research remains concentrated in Western contexts, with limited insights into non-Western or socioeconomically diverse populations.

While traditional enrichment studies focus on pedagogical methods and counseling, few address the integration of artificial intelligence, machine learning, or big data analytics into gifted education frameworks (Napier et al., 2024). This omission highlights a critical frontier for future program design, particularly in aligning enrichment diversity with digital transformation and national innovation goals, such as those embodied in Saudi Arabia's Vision 2030.

The analyzed literature is based on the groundbreaking models, especially Gagné's (2004) differentiated Model of Giftedness and Talent and triarchic theory of Sternberg, which are most used in cognitive and talent development studies. Research in career development often appeals to the theory of career choice developed by Holland and the theory of lifespan, life-space created by Super, but does not combine them into a common model. The methodological diversity is noticeable: VanTassel-Baska (2006) and Gagné (2004) required large-scale empirical designs; Kim (2016) required meta-analytic synthesis to emphasize the heterogeneity of a program, whereas mixed-methods studies by Al-Zoubi (2014) and Reis et al. (2021) have a rich theoretical background despite the generalization being weak. Throughout this literature base, several inconsistencies in operationalizing major constructs exist, especially the concept of diversity in enrichment programs, making it difficult to compare the results of various studies, as well as highlighting the importance of adequate operationalization of concepts.

Comprehensively, the above findings clearly indicate strong evidence that there are benefits of enrichment programs that establish significant gaps in terms of insufficient coverage of cross-cultural and socio-economic differences, lack of synthesis of theories regarding career development, and the lack of incorporating emerging technologies. Filling in these gaps, the given study places enrichment through diversity within a modern framework in which a triangle of cognitive, motivational, and career dimensions with variable educational priorities is envisioned.

Enrichment programs have shown significant benefits for gifted students by enhancing cognitive abilities, fostering creativity, and influencing future career trajectories. Key components typically include project-based learning, leadership development, and structured career guidance, supported by external networks and intrinsic motivation.

Research consistently affirms the educational and professional advantages of enrichment programs for gifted learners. Evidence highlights the role of structured career development in strengthening student identity; however, scholars debate whether these benefits are universal or context-dependent (Kim, 2016; VanTassel-Baska, 2006). Differences also appear between Visessuvanapoom et al. (2024), who emphasize environmental support, and Napier et al. (2024), who stress psychological factors as critical to program success.

Despite substantial literature, key gaps persist. Limited attention has been given to integrating emerging technological innovations into enrichment frameworks. Socio-cultural contexts of Gulf and Saudi populations remain underexplored, despite their unique influence on gifted education. Moreover, conservative educational settings often underrepresent gifted female students. This study examines how Saudi enrichment programs can combine technological approaches with culturally responsive modifications to foster holistic development and career readiness.

This research synthesizes prior findings to identify overlaps and gaps, providing a framework aligned with Saudi Arabia's Vision 2030. The model integrates artificial intelligence, big data, and gender inclusion to advance equitable gifted education. Its implications extend beyond academic settings, offering guidance for national policies and practices aimed at optimizing talent development within the Kingdom. The scopes of this study are as follows:

1. Objective Scope: The research analyzes enrichment programs that impact gifted students through assessment of their cognitive development and creativity, as well as career orientation and program design factors.
2. Time Scope: The research was conducted its assessment during the 2024/2025 academic period to assess present enrichment programs alongside student engagement.
3. Spatial Scope: The research covers all geographic regions of Saudi Arabia, including its East, Central, West, North, and South sectors, where it involves universities together with gifted student centers.
4. Human Scope: University students with gifts, along with graduates taking part in this study, come from different academic fields throughout Saudi Arabia.

3. Methodology

This study used a quantitative research approach to examine the influence of enrichment programs on the professional development of gifted students, enabling explicit measurement and objective analysis of responses (Rahi, 2017). A descriptive-analytical design was applied to investigate enrichment practices and their effects on career choices. Data were collected through an electronic questionnaire, which allowed efficient and structured data gathering from participants across different regions of Saudi Arabia.

The target population comprised gifted university students and graduates residing in Saudi Arabia. A stratified random sampling strategy was employed to ensure representation across

geographic areas and to minimize selection bias (Taherdoost, 2016). Probability sampling was then used to draw a sample representing approximately 15–20% of the accessible population, providing an appropriate and balanced representation for analysis (Rahi, 2017).

Data were gathered using a validated, structured questionnaire with closed-ended items designed to capture perceptions of enrichment programs and their impact on career orientation. The instrument was distributed via university networks and educational platforms to facilitate participation. Internal reliability was high, with a Cronbach's alpha of 0.87, indicating strong consistency. Content validity was established through a multistep process aligned with the study's theoretical framework. First, items were generated following an extensive literature review consistent with the research aims (Rahi, 2017). Next, a panel of five experts in gifted education, psychology, and educational measurement reviewed each item for clarity, cultural appropriateness, and alignment with enrichment program constructs, and their feedback informed refinements to wording and context. A pilot test with 30 gifted students of a similar profile was then conducted to detect ambiguities and confirm preliminary reliability before full administration. Construct validity was examined using item-to-dimension correlations, and internal consistency was further supported by the Cronbach's alpha value of 0.87. These procedures complemented the descriptive-analytical design and strengthened the basis for subsequent inferential analyses, including t-tests, ANOVA, and Pearson correlation-regression.

Statistical analysis was conducted using SPSS version 26. Descriptive statistics were used to summarize participant responses, and inferential tests, including t-tests, ANOVA, and Pearson correlation and regression, were employed to examine group differences and relationships among variables. Multiple regression analysis was additionally used to evaluate the combined effects of enrichment program diversity, number of programs, and program type on career path clarity and orientation, enabling simultaneous assessment of predictors without altering the theoretical framework or cited sources.

4. Results

This section outlines key findings based on participant responses, starting with demographic characteristics, followed by questionnaire validity and reliability. Hypothesis test results are then reported and structured to reflect relationships among study variables.

The data presented in Table 1 demonstrate significant demographic findings about the study participants. Most respondents were university graduates at 41.7%, while students from fourth-level education made up 36.4% of the sample, and those from third-level and second-level education amounted to 14.9% and 5.8%, respectively, with first-level education participants at 1.0%. The participant population had equal gender representation, where females numbered at 50.4% while males composed 49.6% of the total participants. Most students demonstrated academic success with their reported GPAs between 4.00 and 5.00, reaching 93.3% of the total participants.

Most students recorded higher grades in GPA categories because 6.0% had scores between 3.75 and 3.99, while 0.5% held GPAs between 3.00 and 3.74, and 0.2% had GPAs between 2.00 and 2.99. Students from public institutions composed the biggest group (64.3%) compared to students from private institutions (35.7%). Participants mainly pursued one to three enrichment programs (86.3%), but 10.6% took four to six programs, and only 0.7% completed over six programs, while 2.4% never participated in these activities.

Our questionnaire displayed valid measurements of intended constructions through the application of Spearman's correlation coefficients between items and their corresponding dimension totals as presented in Table 2. The first-dimension analysis showed total validity because all coefficients achieved statistical significance from 0.344 to 0.725. The second dimension achieved meaningful correlations between 0.328 and 0.692, which confirmed its complete validity. All items obtained robust internal consistency from the third and fourth dimensions through their statistically significant coefficients that ranged from 0.272–0.826 and 0.579–0.769, respectively.

Table 1: Distribution of sample by personal characteristics

Characteristic	Category	Number	Percentage (%)
Academic level	First level	4	1.0
	Second level	24	5.8
	Third level	63	15.2
	Fourth level	151	36.4
	University graduate	173	41.7
Gender	Male	206	49.6
	Female	209	50.4
Cumulative GPA	2.00–2.99	1	0.2
	3.00–3.74	2	0.5
	3.75–3.99	25	6.0
	4.00–5.00	387	93.3
School type	Public school	267	64.3
	Private school	148	35.7
Number of enrichment programs participated in	1–3 programs	368	88.7
	4–6 programs	44	10.6
	More than 6 programs	3	0.7
Total		415	100.0

Table 2: Item-to-dimension score correlations

Item no.	Item statement	Correlation
	Dimension 1: Impact of enrichment program diversity on career paths	
1	The enrichment programs I participated in contributed to guiding my choice of my current career path.	0.725
2	The diversity of enrichment programs I participated in played a role in refining my professional skills.	0.538
3	The number of enrichment programs I participated in positively influenced my career path sufficiently.	0.344
4	Enrichment programs helped me discover my professional interests and abilities at an early stage.	0.639
5	Enrichment programs encouraged me to develop communication skills necessary for professional success.	0.559
6	Enrichment programs encouraged me to develop leadership skills necessary for professional success.	0.472
7	Enrichment programs provided me with opportunities to explore various professional fields, aiding in my career path selection.	0.679
8	The stimulating environment of enrichment programs helped me clearly define my professional goals.	0.638
	Dimension 2: Relationship between type of enrichment program and career path	
1	Academic enrichment programs contribute to shaping my orientation toward a career path related to my field of study.	0.692
2	My participation in advanced STEM enrichment programs influenced my choice of a related career path.	0.558
3	Research-focused enrichment programs help develop the research skills necessary for my academic career path.	0.494
4	I could not identify a clear relationship between the type of enrichment programs I participated in and my current career path.	0.328
5	Skill-based enrichment programs encourage choosing a career path that aligns with my interests and abilities.	0.583
6	The enrichment programs I participated in were diverse enough to help me select a suitable career path.	0.547
7	I believe career path clarity depends more on the quality and suitability of enrichment programs than their quantity.	0.639
8	The diversity of enrichment programs allowed me to compare different career paths before deciding.	0.610
	Dimension 3: Impact of number of enrichment programs on career clarity	
1	Participating in a limited number of enrichment programs reduces my chances of discovering the most suitable career path.	0.811
2	The more enrichment programs I participated in, the clearer my career vision became.	0.789
3	I did not notice a significant difference in my career path clarity based on the number of enrichment programs I participated in.	0.272
4	Participating in multiple enrichment programs allowed me to identify my strengths and weaknesses regarding my career path.	0.817
5	Participating in many enrichment programs may distract gifted individuals from focusing on a specific career path.	0.277
6	My conviction about my current career path solidified after participating in as many enrichment programs as possible.	0.826
7	The diversity of enrichment program fields helps me acquire multiple skills required for my career path.	0.306
8	Talent-class enrichment programs contribute to clarifying various career options I may choose from in the future.	0.826
9	Collaboration with my gifted peers in enrichment programs enhanced my professional aspirations.	0.355
	Dimension 4: Key factors influencing enrichment programs in career selection	
1	I believe that the diversity of enrichment program fields is one of the most important factors helping gifted individuals select an appropriate career path.	0.661
2	Interaction with experts and specialists in enrichment programs is a significant factor in guiding gifted individuals toward specific career paths.	0.587
3	Enrichment programs that focus on life and personal skills contribute to preparing gifted individuals to adapt to the demands of various career paths.	0.601
4	Practical and applied activities in enrichment programs serve as motivating factors for gifted individuals to choose career paths that align with their interests.	0.671
5	The duration and number of hours of an enrichment program influence the extent to which gifted individuals benefit in shaping their career choices.	0.597
6	A supportive and stimulating educational environment in enrichment programs plays a role in encouraging gifted individuals to explore new career paths.	0.579
7	Self-assessment and feedback from program supervisors help gifted individuals choose career paths that align with their abilities.	0.691
8	Opportunities for communication and experience exchange with other gifted individuals influence their career orientation.	0.679
9	Enrichment programs that provide training experiences and professional development opportunities guide gifted individuals toward more mature career choices.	0.755
10	Linking the content of enrichment programs to labor market needs is an essential factor in helping gifted individuals choose relevant career paths.	0.769

Significance level for all items: 0.000

Spearman's correlation served to evaluate validity by measuring associations between each dimension's total scoring and the overall independent variable rating. Table 3 demonstrates the validity of the measure through correlation coefficients between 0.643 and 0.824. Test results retain their consistent nature whenever testing occurs repeatedly. The study employed the percentile probability method for assessing reliability because this technique is appropriate for multiple-choice questions with five response options. Different dimension components showed Cronbach's Alpha values extending from 0.514 to 0.854 (Table 4). High consistency emerges from the tested reliability score of 0.846. The study analyzed enrichment program diversity effects on gifted career paths through T-test methodological analysis of actual and hypothesized mean scores (3 points). All items in Table 5 surpassed the value evaluated, which demonstrated a positive effect. All scores achieved statistical significance in the analysis except for the results from item (3), which did not reach the projected mean score level. The data demonstrates that respondents favor enrichment program diversity because statistical evaluations verified its beneficial impact.

Table 3: Correlations between dimension totals and overall independent variable score

No.	Dimensions	Correlation coefficient	Significance level
1	The impact of enrichment program diversity on career path formation for gifted individuals	0.747	0.000
2	Examining the relationship between the type of enrichment programs and the career paths of gifted individuals	0.824	0.000
3	The impact of the number of enrichment programs on career path clarity for gifted individuals	0.709	0.000
4	Identifying key factors influencing enrichment programs in career path selection from the perspective of gifted individuals	0.634	0.000

Table 4: Cronbach's Alpha coefficient for reliability testing of the scale dimensions

No.	Dimensions	Cronbach's alpha
1	The impact of enrichment program diversity on career path formation for gifted individuals	0.610
2	Examining the relationship between the type of enrichment programs and the career paths of gifted individuals	0.514
3	The impact of the number of enrichment programs on career path clarity for gifted individuals	0.790
4	Identifying key factors influencing enrichment programs in career path selection from the perspective of gifted individuals	0.854
	Overall reliability: 0.846	

A t-test analyzed how enrichment program types relate to career path development by examining the difference between the actual data points and those from the hypothesis (3 points). The mean scores from Table 5 demonstrated positive correlations since they exceeded the 3-point value. All statistical results were significant, which shows that most participants agreed with the findings. The results prove that the types of enrichment programs directly impact how gifted people develop their future careers.

The T-test evaluated how enrichment program quantity affects career path clarity for gifted individuals by comparing actual and hypothesized mean scores (3 points). All mean scores in Table 5 surpassed the value of 3 points, apart from items (1) and (6). Most measured items demonstrated statistical significance, which showed participants agreed about how enrichment program quantity affects career clarity. The research results confirm how involvement in enrichment programs directly impacts the development of career directions for gifted students.

The analysis of career path selection enrichment programs used a T-test to compare actual results with hyped mean scores (3 points). Every mean score in Table 5 surpassed the value of 3 points, and statistical significance was confirmed for all items. The respondents demonstrated complete agreement on the significance of these factors, which play a central role in helping gifted individuals decide on their careers.

Research data shows that experiences with enrichment programs display a strong relationship with gifted individuals developing their future careers. The participants demonstrated both advanced academic performance and enthusiastic class involvement. The combination of diverse programs and different program types and quantities determined how much program aids developed their career focus and career-specific skills, and career vision. The selection of careers was mainly determined by the alignment to relevant programs, coupled with experienced expert contacts and a match between market demand and educational offerings. Defined enrichment programs play an essential role in providing academic and professional development for gifted students.

5. Discussion

The study results stand in line with previous studies that show that enrichment programs can lead to intellectual development, imagination, and career excellence in the gifted students (Kim, 2016; VanTassel-Baska, 2006). The diversity and constructive design of the programs proved to be the major factors that affected the acquisition of skills, decision-making processes, and the turning towards the profession. The practical and leadership aspects of project-based learning seem to be the most valuable when it comes to developing analytical and problem-solving skills, whereas the concept of structured models seems to cultivate the skills of creative decision-making (Al-Zoubi, 2014; Reis et al., 2021). This goes in line with evidence showing that enrichment programs have been found to cause both cognitive and socio-emotional development when such programs are well-designed. Exposure of students to a variety of career pathways is also facilitated through diversity in these programs, which encourage them to explore the various fields. All these results indicate the significance of factoring in the combination of diversity and structure in program design to achieve its best results.

One of the major contributions of the current study is to demystify how different enrichment models promote the development of a career that involves exposure to different learning environments. On the same note, Aljughaiman and Ayoub (2012) proved that systematic enrichment builds analytical and creative abilities that are critical in career education. Casino-García et al. (2021) also pointed out that the depth of content produces more career awareness as compared to an increment in the number of sessions, which has also been echoed in the results of this study. This evidence places the program quality and coherence as the key determinants of the effectiveness of enrichments. Hence, these factors can be put first to enhance a more closely matched relationship between enrichment activities and long-term career aspirations of students.

The findings also show that the quality of the program, practicability, and relevance take more precedence over the number of enriching experiences. Even though repeated exposures can be used to expand horizons, they do not in themselves aid in sorting out career paths among gifted students in any significant way. Such a conclusion is in context with the NAGC (2023), which also supports authenticity and depth in programs rather than program volume. Similarly, Elballah et al. (2024) claimed that enrichment programs must have structured and practical elements that may lead to meaningful results. The existing evidence shows that, when in line with the requirements of the labor market, enrichment positively influences career choice and ease of transfer of skills. These implications indicate that intentional programming structure proves to have a greater impact than adopting a larger scale of opportunities.

There were also practical elements and built-in career counseling that were found to be essential in efficient enrichment programming. The study affirmed that practical learning settings increase the accuracy of career choice, since the results of this research were like Santos and Natividad (2023). Previously, the role of career counseling in the development of stable career patterns was also supported by other evidence by Lubinski and Benbow (2006), as well as Skovholt et al. (2001). Quite conversely, Moon et al. (1994) laid stress on psychological leadership qualities, but the current research report defines cognitive and practical skills as more powerful indicators of career preparedness.

This disparity could be in terms of context or programs between studies. The awareness of these differences contributes to the knowledge of how enrichment design may be adjusted to address the needs of different students.

Table 5: Results of the t-test for the validation of the study's hypotheses

Statistical significance	T-value	Relative weight (%)	SD	Mean	Item	Item no.
Dimension 1: The impact of the diversity of enrichment programs on shaping career paths for the talented						
0.000	51.958	93.30	0.65	4.67	The enrichment programs I participated in contributed to guiding my choice of my current career path.	1
0.000	51.853	89.78	0.59	4.49	The diversity of enrichment programs I participated in played a role in honing my professional skills.	2
0.196	1.294	61.83	1.44	3.09	The number of enrichment programs I participated in positively affected my career path sufficiently.	3
0.000	42.617	88.43	0.68	4.42	The enrichment programs helped me discover my professional interests and abilities early.	4
0.000	46.248	88.29	0.62	4.41	The enrichment programs encouraged me to develop the communication skills necessary for professional success.	5
0.000	48.272	88.96	0.61	4.45	The enrichment programs encouraged me to develop the leadership skills necessary for professional success.	6
0.000	45.100	89.98	0.68	4.50	The enrichment programs provided me with opportunities to explore various professional fields, helping me identify my current career path.	7
0.000	52.718	91.81	0.61	4.59	The stimulating environment of the enrichment programs helped me clearly define my career goals.	8
0.000	51.958	86.55	0.41	4.33	Overall mean	-
Dimension 2: Verifying the relationship between the type of programs benefited by the talented and their career path						
0.000	55.403	91.71	0.58	4.59	Academic enrichment programs contribute to shaping my orientation toward a career path related to my field of study.	1
0.000	46.540	87.37	0.60	4.37	My participation in advanced science and mathematics programs played a role in choosing a career path related to these fields.	2
0.000	38.151	87.86	0.74	4.39	Enrichment research programs contribute to developing the research skills required for my academic career path.	3
0.006	2.772	64.14	1.52	3.21	I could not observe a clear relationship between the type of enrichment programs I participated in and my current career path.	4
0.000	49.848	88.92	0.59	4.45	Talent enrichment programs encourage me to choose a career path that aligns with my interests and skills.	5
0.000	44.912	88.96	0.66	4.45	The enrichment programs I participated in were diverse enough to help me choose the right career path.	6
0.000	54.278	91.23	0.59	4.56	I believe that the clarity of the career path depends more on the quality and relevance of the enrichment programs to my interests rather than their number.	7
0.000	49.828	91.04	0.63	4.55	The diverse enrichment programs gave me the opportunity to compare different career paths before deciding.	8
0.000	70.699	86.40	0.38	4.30	Overall mean	-
Dimension 3: The impact of the number of enrichment programs on the clarity of the career path for the talented						
0.253	-1.145	58.31	1.50	2.92	Participating in a limited number of enrichment programs reduces my opportunities to discover the career path that best suits me.	1
0.008	-2.687	56.43	1.35	2.82	The more enrichment programs I participate in, the clearer my career path becomes.	2
0.000	33.573	88.05	0.85	4.40	I found no significant difference in the clarity of my career path based on the number of enrichment programs I participated in.	3
0.049	-1.972	57.35	1.37	2.87	Participating in multiple enrichment programs gave me the opportunity to identify my strengths and weaknesses in relation to my career path.	4
0.000	30.088	87.23	0.92	4.36	Participating in a large number of enrichment programs may distract the talented from focusing on a specific career path.	5
0.196	-1.295	58.17	1.44	2.91	My conviction about my current career path was reinforced after participating in as many enrichment programs as possible.	6
0.000	35.217	88.39	0.82	4.42	The diversity of the enrichment programs' fields helped me acquire multiple skills required for my career path.	7
0.000	13.707	72.24	0.91	3.61	Talent classes contribute to clarifying various career options I can choose from in the future.	8
0.000	35.667	88.19	0.81	4.41	Collaborating with my gifted peers in enrichment programs enhanced my professional ambitions.	9
0.000	18.314	72.71	0.71	3.64	Overall mean	-
Dimension 4: Identifying the key factors influencing enrichment programs in career path selection from the perspective of the talented						
0.000	65.901	94.31	0.53	4.72	I believe that the diversity of enrichment program fields (scientific, literary, artistic, etc.) is one of the most important factors helping the talented choose the right career path.	1
0.000	50.089	88.24	0.57	4.41	Interaction with experts and specialists in enrichment programs is an important factor in guiding the talented toward specific career paths.	2
0.000	53.104	90.07	0.58	4.50	Enrichment programs focusing on life and personal skills contribute to preparing the talented to adapt to the requirements of different career paths.	3
0.000	55.851	91.57	0.58	4.58	Practical and applied activities in enrichment programs are motivating factors for the talented to choose career paths that match their interests.	4
0.000	56.182	91.18	0.57	4.56	The duration and number of hours of enrichment programs affect the extent to which the talented benefit from them in shaping their career options.	5
0.000	56.278	90.84	0.56	4.54	The supportive and motivating educational environment in enrichment programs plays a role in encouraging the talented to explore new career paths.	6
0.000	59.041	91.95	0.55	4.60	Self-assessment and feedback from enrichment program supervisors help the talented select career paths that match their abilities.	7
0.000	55.921	91.76	0.58	4.59	Opportunities for communication and experience exchange with other gifted individuals in enrichment programs influence the formation of the talented professional orientations.	8
0.000	65.563	93.98	0.53	4.70	Enrichment programs that provide training experiences and professional development opportunities guide the talented toward more mature career choices.	9
-	67.605	94.17	0.51	4.71	Linking the content of enrichment programs with labor market needs is an important factor helping the talented select relevant career paths.	10
0.000	239.442	91.81	0.37	4.59	Overall mean	-

SD: Standard deviation

The correlation between the quality of enrichment and aspirations to STEM careers offers further insights into the program effects. As seen in Visessuvanapoom et al. (2024), structured

enrichment has a stronger effect on the career outcomes, compared to both familial and institutional support, and the current study also replicated these findings. The results highlight the transformational nature of well-built enrichment plans as a means of closing the disparities and helping diverse students. Diversity of the culture and geography enriches the applicability of enrichment patterns in the different educational settings. An attorney who can integrate his program design with the Saudi Arabia Vision 2030 enhances the applicability of such findings in his national policy and workforce development. Future innovation of gifted education consists of a combination of diversity, technology, and cultural responsiveness.

Generally, this paper suggests a paradigm that integrates diversity, design, and practice in the application of enrichment programs. The framework is consistent with labor market developments as well as the ability of gifted learners to make decisions concerning their careers. These are contributions that add theoretical knowledge regarding enrichment and guide applied means of improving programs. These insights can guide educators and policymakers in planning inclusive and skill-based programs that will promote opportunity equalization. The findings ought to translate into longer-term studies that should be undertaken to understand the long-term effects on the career. These studies will help to perfect enrichment practice, and they will develop sustainable routes towards the growth of gifted education.

6. Conclusion

A structured framework consists of six core strategies to implement prompt engineering: clear instructions, reference text, step specification, task breakdown, model reasoning, and external tool integration. Precise outputs together with relevant and understandable solutions emerge when using practical methods like chain-of-thought prompting alongside step-by-step decomposition and persona adoption and reference-based answering. Prompt design follows a systematic structure based on clear requirements and context layers, which requires continuous enhancement according to the guide.

The research defines prompt engineering as an established discipline through its formalization process. New standards for prompt writing make the intuitive trial-and-error process of writing prompts evolve into an organized framework for creating optimal prompts. Prompting techniques demonstrate universal application within educational institutions as well as healthcare and legal domains, customer support organizations, and creative industries. The modular structure of the system allows both expert and non-expert users to reach the best possible outcome from LLM models while expanding broad accessibility and scalability.

This study adopts prompt engineering methods to solve foundational LLM problems, although it fulfills specific limitations in addressing issues such as hallucinations, together with ambiguity, misinterpretation, and fact validation. The field requires established evaluation standards for determining prompt performance and anthropomorphic behavior measurement. The strategies create prompt design as an essential basis for human-AI interaction, which improves AI reliability while reshaping collaborative problem-solving.

6.1. Recommendations

All enrichment programs for gifted students require more diversity in their scope, which institutions can achieve by building partnerships with universities, together with industries and talent organizations. The integration of AI-based career guidance needs to become part of national digital education platforms operating within schools. The teacher training program must implement modular structures that offer customized mentoring services and employment destination assessments with certification approvals provided by the ministry. The national evaluation system must track students through data dashboards and perform extended assessments to measure program achievements and optimize program design. The evidence-based strategies produce personalized and future-oriented career guidance that links to Saudi Vision 2030 and worldwide workforce requirements.

6.2. Study implications and future directions

This research demonstrates how different enrichment programs need to focus on connecting gifted students between their career choices and available professional opportunities. The study results confirm that integration of experiential learning with expert mentoring alongside AI-driven counseling should be implemented when creating new programs. Longitudinal research methods should be used to study professional development and determine the connection between digital and interdisciplinary enrichments to career clarity. Equity evaluation needs to be extended to both student groups and regional educational management systems.

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Compliance with ethical standards

Ethical considerations

Ethical approval was obtained prior to data collection. Participation in the questionnaire was

voluntary and anonymous, with informed consent secured from all 415 students and graduates. No personal or sensitive information was collected, and confidentiality was fully maintained throughout the study.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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