



Research Article

Reflecting on the role of mentorship in gifted education: Mixed approach study

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Abstract

This study fills several knowledge gaps within the literature of gifted education, specifically with respect to the role of mentorship in guiding and developing gifted young minds as they begin to move into advanced academic and professional environments. It surveys the experiences of college students, all of whom had participated in a university-based gifted mentorship program in high school, by asking them to relate their impressions of the program and its effects on their cognitive and research skills. It takes a mixed-method approach by analyzing an online questionnaire answered by 71 students, as well as responses to two open-ended questions answered by 35 students; finally, it conducts individual interviews with 10 students. Results indicate positive student perceptions toward the program overall, and positive correlations between those perceptions and other specific factors studied, with perceptions of cognitive development and university mentors being the most strongly correlated. Students also raised some unanticipated factors that may have contributed to shaping their impressions, including the characteristics of their mentors, as well as aspects related to program implementation and learning elements. Recommendations for future research are then provided.

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Introduction

There is a myth that young people with outstanding gifts, abilities or aptitudes are smart enough and capable enough to help themselves—that they do not require the same kinds of investments from educators that their peers do. This study, however, begins from a recognition that this illusion does more harm than good, and that gifted students, like all other students, require ongoing attention, guidance and structure in order to thrive at full capacity. The literature agrees that the standard approach to educating gifted or talented children involves the enhancement and acceleration of a particular skill within a more comprehensive curriculum. In recent years, the Kingdom of Saudi Arabia (KSA) has seen considerable growth in its gifted education programs. Gifted students have been provided with various types of enrichment opportunities, which are typically interactive, and project focused, thereby allowing those students who are in need of extra challenges to stay engaged and interested in the classroom.

One of the educational alternatives most recently adopted by the education system in KSA has been university-based mentorship. This initiative involves assigning a student to work closely with a professor, who provides one-on-one guidance and support to aid in the student's development as a future professional in their field. (Rhodes, 2002). Hébert (2014) suggests that the major benefit of a university-based mentorship program is the cultivation of advanced skills not normally acquired in school, which may lead to a potential career path. The kind of guidance that mentors provide is an invaluable means of academic, social and emotional support for gifted children, who often see mentorship programs as essential opportunities within school systems that are otherwise unable to provide for their intellectual and other needs in a sustained way (Callahan & Kyburg, 2005).

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However, within the field of gifted education, mentoring is a relatively new topic of study, and conclusions remain mostly theoretical and limited. There has even been a certain amount of controversy regarding the evidence supporting such initiatives. While there is widespread agreement that mentorship programs are beneficial overall, there appear to be differing opinions with respect to the extent and locus of those benefits. (Stewart & Openshaw, 2014). Baum, Schader, and Tung (2019), put forward a critical study arguing that the concept of mentorship itself is complicated and ambiguous, and so is likely to be operationalized quite dissimilarly by different authors. Furthermore, student perceptions on the benefits of mentorship continue to vary greatly. One recent study noted that while some gifted students participating in a program described their mentors using words like “guidance,” “helping,” and “connection,” others used words such as “controlling”, “uncommitted” or “kind of hindering” (Brigandi, Weiner, Siegle, Gubbins & Littlethis, 2018).

Research suggests a need for evaluation of mentorship programs with a view toward increasing positive outcomes for students over the long term (Little, Kearney & Britner 2010). Unfortunately, there is an overall dearth of evaluation studies being conducted with regard to the benefits of mentoring programs, especially those that spotlight the impressions of the gifted students themselves. Moreover, there is virtually no research to this point that centers its analysis on gifted education in the Middle East. The present study fills in these knowledge gaps with an exploration and examination of the experience of gifted students who have participated in a university-based mentorship program in the KSA. The analysis focuses on students’ general perceptions of the program as well as on their relationships with their mentors, the level of academic rigor, and their cognitive and research skills development.

Using Mentorship Strategy in Gifted Education

Globally, researchers have argued that the curricula of ordinary schools are generally insufficient to meet the needs of gifted children and that to respond appropriately, curricula must become multidimensional, utilizing creativity and innovation to engage and challenge students (Coleman, Micko & Cross, 2015). Although there are a variety of educational models designed to cultivate the talents of gifted students, one attribute that is common to them all is the establishment of accelerated criteria which raise the expectations normally set for students to have achieved a particular goal (Adams, 2018). This means gifted students are met with curricula that challenge them beyond what would be appropriate for other students. Research has found that in many cases these exceptional students enjoy being asked to perform unique and thought-provoking tasks, which tap into their interests and passions and are perceived to be meaningful and relevant to their lives. In fact, gifted students tend to express a strong desire to increase levels of rigor, complexity, and depth as they learn (Coleman et al. 2015; Kitsantas et al. 2017; Potts, 2019). These students are more willing to commit themselves to projects that they perceive as meaningful and challenging (Siegle et al. 2014), especially when those projects are customized according to their personal interests or learning goals (Garn & Jolly, 2014). One of the reasons why mentorship programs are ideal for gifted students is that mentors are typically experts in a mentee’s fields of interest, and so are well-equipped to guide a student through the kinds of trials necessary for skill development. This is why mentorship is sometimes thought of in terms of a service delivery approach, offering gifted students the academic, social and emotional support they need to thrive. These programs may also provide specialized college and career guidance by linking learners to resources that will encourage their professional development (Runions & Smyth, 1985).

There is wide-spread agreement in the field that giving gifted students the opportunity to conduct interest-based independent investigations yields an overall increase in their learning outcomes, enhances their intrinsic sense of motivation, and ultimately aids in the development of their creativity and self-direction (Mammadov & Abdullah 2014). For these reasons, mentorship programs for gifted students often involve some sort of independent study carried out by the student and supported by their mentor. Independent study is a crucial element of many effective gifted education models, including The Purdue Three-Stage Model by Feldhusen (1980), The Enrichment Triad Model by Renzulli (1978), and The Self-Directed Model by Treffinger (1975). When designed with a careful and comprehensive view toward student need, and when facilitated by a skillful instructor, the outcomes of independent study programs for gifted students are quite promising. Research has found that these experiences can increase a student’s intrinsic motivation, as well as their critical and creative skills; they can also improve a student’s feelings of self-efficacy with regard to research and creative productivity by providing authentic learning experiences.

Rhodes and Du Bois (2008) argue that one role of a mentor is to expand for a student what is referred to as Vygotsky’s (1978) zone of proximal development (ZPD). ZPD indicates the range between a student’s level of achievement when they work alone to solve a problem and their level of achievement when they work under the guidance of a mentor. Mentorship provides the impetus these students need to develop beyond the limits of their

comfort zones and broaden their intellectual horizons. This is especially crucial due to the fact that many gifted students are underachieving in the classroom as a result of feeling insufficiently challenged by the curriculum. Of course, even students who are already performing well in academic settings can benefit greatly from a relationship with a mentor, who may serve as a model of professional achievement and offer valuable first-hand career guidance (Clasen & Clasen, 1997). As McMahon (1997) argued, learning is a social process and so is meaningful only in the context of social activity. For this reason, the most effective mentors appear to be those who prioritize responsiveness and offer equal amounts of structure, challenge, enjoyment and support to their students (Csikszentmihalyi & Rathunde, 1998).

In theory, mentorship programs for gifted students should incorporate rigorous environmental and intellectual stimulation with the kind of positive role modeling that encourages students to progress beyond the academic options available to them in their regular school curricula. The best research-based practices have indicated a number of components that contribute to optimal learning outcomes in these programs (Winebrenner, 2012), including a strong relationship between scholar and mentor and active facilitation on the part of the mentor (Odena & Welch, 2012; Van Tassel-Baska, 2010), direct interaction and collaboration among the students themselves (Davalos & Haensly, 2012), intentional reflection on the part of the learner in order to connect new information with existing experience (Ambrose et al. 2012; Angelo & Cross, 2012; Piirto, 2012; Thompson et al. 2010), and immediate real world application of learned skills and knowledge (Reis & Renzulli, 2012; Thompson et al. 2010).

In practice, research evaluating the effectiveness of mentoring for gifted students is favorable, if somewhat sparse and outdated. One such study by Beck and Elmo (1989) concluded that the mentorship program under analysis produced significant personal, academic, and career-choice effects on its participants. They recommended the program, which included both classroom and direct mentoring components, as an integral part of comprehensive education plans for gifted students. Pleiss and Feldhusen (1995) reviewed two successful gifted mentoring programs, which ranged in duration from six weeks to two years and involved one-to-one mentoring as well as small groups. The first program was conducted by and at a student's normal school but would involve them in special activities with the support of experts from their community. The second was a university-based program where students would be encouraged to participate in an advanced academic setting and then receive expert guidance from a faculty member or graduate student. As a part of these programs students were able to inquire about potential careers or fields of interest and undertake projects in a professional setting, opportunities that were shown to have a measurable impact on their self-perceptions.

A more intimate study (Hibert & Olenchak 2000) highlighted the effectiveness of mentoring to adjust underachievement issues in gifted individuals by examining the experiences of three male students of varying ages and backgrounds, all of whom were identified as gifted and underachieving. The study revealed that the single most dominant factor in the success of mentoring was the significance of the mentor's influence on the young person as an adult who they could look up to and learn from. The researchers delineated three categories of specific traits that were perceived as favorable, including the mentors' open-minded and nonjudgmental characteristics, their consistent and personalized social/emotional support and advocacy, and their ability to utilize strength and interest-based strategies to intervene and reverse underachievement.

In a similar study, Little, Kearney, and Britner (2010) evaluated the experiences of 71 gifted teenagers attending a university-based summer mentorship program. Results demonstrated meaningful increases in students' self-perceptions with regard to their skills and job competence. Overall, students reported positive experiences with their mentors, especially those who were friendly, engaging and willing to invest time and energy to build quality relationships with mentees.

The correlation between positive perceptions and the quality of relationship among mentors and students is an enduring theme across the literature and across populations. In a study focused on a yearlong mentorship program for 36 elementary-school-aged children of immigrants, Chen et al. (2016) showed that mentoring can expand the sociocultural circle of students and families while challenging mentors to broaden their own perspectives by listening, understanding and adjusting techniques to meet unique learning needs.

Researchers have also found that online mentoring produces consistently positive results with respect to students' motivation, communication and professionalism. Applying a qualitative approach to investigate the effects of e-mentoring on the academic achievements of five gifted students in the field of mathematics, Mammadov and Abdullah (2014) found that participating students showed increased levels of motivation and desire and so were able to persevere and complete demanding tasks. The study reported that mentored students were quick to collaborate and

find ways to interact efficiently as a group to solve problems, and that by treating students as practicing professionals, mentors encouraged them to think and work as experienced mathematicians.

Findings from a more recent study (Brigandi, Weiner, Siegle, Gubbins & Littlethis, 2018) indicate a positive relationship between the participation of secondary-school students in an enrichment program and their environmental perceptions. The study investigated the environmental perceptions of 10 gifted students, with data including responses from students, parents and teachers to short-answer surveys and semi-structured interviews, as well as the students' work itself. Students benefited from their interactions with a teacher trained in gifted education, from group learning with other gifted peers, from parental involvement, and from their constructive relationships with project mentors. There was, however, some variation with respect to student perceptions insofar as the most successful student–mentor connections appeared to be those in which students felt the relationship was personal as well as academic.

Confirming many of the same conclusions about university-based mentorship, Wu, Pease, and Maker (2019) studied the perceptions of gifted students who participated in a program called Cultivating Diverse Talents in STEM through (a) a university-based summer internship program, (b) subsequent school-year research internships, and (c) successive summer workshops or internships. The researchers performed a comprehensive qualitative evaluation revealing that over the course of the program students saw an increase in academic engagement, prepared themselves to transfer from secondary school to university, and developed their practical skills beyond the level of their peers. Students perceived themselves as having gained clarity with regard to their academic and career goals. Researchers concluded that mentoring is one crucial means by which the gifts of the next generation of scientists would be developed.

Problem of Study

As a review of the literature reveals, research on gifted mentoring has been far too limited in certain respects, indicating that some widely accepted conclusions in the field may not adequately capture the breadth of experiences and outcomes associated with gifted mentorship in different contexts. Specifically, evaluation is still needed regarding the way in which environmental factors influence the perceptions of students as to the effectiveness of mentoring programs. For example, a number of previous studies undertook a focus on mentoring in university-based summer programs, which have a distinct atmosphere compared to those that take place during the regular school year. A finding from the (2010) study by Little, Kearney, and Britners reveals most students who entered the summer program did so with high pre-existing levels of perceived competence, likely contributing to more positive perceptions overall. The study determined that although students did tend to perceive their research skills as competent prior to participating in the mentorship program, their self-perceptions had increased even more significantly after mentoring. However, the findings remain vague due to the fact that the study did not specifically operationalize perceived achievement as an outcome of gifted mentorship programs.

In contrast, the present study is intentionally structured to evaluate gifted students' perceptions of how their academic achievement and research skills have changed as a result of mentoring. The present study samples gifted students who were randomly selected to participate in mentorship programs in five distinct governmental universities located in different cities during the regular academic year, which might limit some environmental bias. It is a central aim of this study to explore student perceptions of learning in mentorship programs because the research shows gifted students tend to be more engaged by interest-based projects and tasks, meaning that understanding their impressions is particularly important. A theme emerged in the 2018 study by Brigandi, et al. showing that gifted students who participated in a challenging school-based enrichment program were more likely to report positive environmental perceptions. We know that supportive student-mentor relationships and the provision of rigorous curricula are both shown to be valuable attributes of mentorship enrichment programs, so taking a cue from Brigandi, the present study considers the perceived difficulty of challenges faced in mentoring programs, and how those perceptions relate to student engagement.

A second significant blind spot in the literature is its near-exclusive focus on the American and European context, with very little focus on gifted education in other regions of the world. In fact, the author was unable to identify a single study on gifted mentorship programs carried out in the Middle East, suggesting an urgent need for contributions to the literature. Thus, the primary aim of this study is to explore the experiences of gifted students in university-based mentorship programs in the KSA in particular, with a concentration on student perceptions regarding mentors, academic and research skills.

Finally, the most unique aspect of the present study is that it evaluates student perceptions of their university-based mentorship program one year after having participated, when students are fully enrolled in college. It takes its cue from Lubinski et al. (2014) who, in a landmark study, documented the careers, accomplishments, psychological wellbeing, families, and life preferences and priorities of talented young persons who had participated in the Study of Mathematically Precocious Youth, by analyzing a collection of data approximately four decades later. Researchers found that, on the whole, participants had developed their human capital in a way that advanced society finds valuable, and that they were pursuing productive and satisfying lives on a number of diverse paths. With this in mind, the present study sought to evaluate the effect of mentoring programs over time and, in particular, after students had the opportunity to attend university and reflect on their experiences.

This study will survey the experiences of college students, all of whom participated in a university-based gifted mentorship program in high school, by asking them to relate their impressions of the programs and its effects on their cognitive and research skills. Specifically, it seeks answers to the following questions:

- What are the perceptions of college students regarding the university-based gifted mentorship program they participated in during secondary school?
- What, if any, is the relationship between gifted students' general perceptions of the program and their perceptions of their relationship with mentors, the level of academic rigor, and the development of their cognitive abilities and research skills?
- How did gifted students describe their experiences in the university-based mentorship program?

Methods

Research Model

The design used in this study is the explanatory sequential design. This is a mixed approach in which quantitative and qualitative data are collected and analyzed, whether simultaneously or consecutively, and then integrated in one or more stages of the study (Creswell, 2013; Johnson and Onwuegbuzie, 2004). According to the design, this study first collects its quantitative data, in the form of survey responses, which provides a solid ground upon which to analyze the qualitative data that will be collected later in interviews and open-ended questions. The qualitative data then serves to expand and deepen our understanding of the survey responses. Results of the quantitative and qualitative findings are then integrated at the interpretation stage of the study, when conclusions drawn from the quantitative phase are supplemented with examples or counterexamples from the qualitative phase.

Participants

The Future Researcher Program (FRP) is a university-based mentorship program for gifted high school students launched as an initiative by the Ministry of Education in collaboration with five governmental universities across the Kingdom of Saudi Arabia. A total of 100 students were selected to participate, with 20 students assigned mentors at each of the five universities. To be eligible for the FRP, students had to be in the 11th or 12th grade and formally designated as *gifted*. (In Saudi Arabia, a student can be formally considered gifted, and therefore eligible to receive special services, upon entering third grade if they have achieved a superior score on a nationalized assessment developed primarily for identifying intellectual giftedness, e.g. Mawhiba.) Beyond that, selections took place with the goal of achieving a diverse group with equal representation in targeted categories such as gender, or cities and high schools of origin. The program has several stated goals, which are as follows:

- Prepare a generation of researchers in a number of fields, including those specializations that will contribute to achieving the Kingdom's 2030 vision.
- Enrich students according to a solid scientific methodology.
- Improve the scientific research skills of gifted students.
- Increase positive attitudes towards research institutions.
- Enhance the collaborative skills of gifted students.
- Spread a culture of scientific research among gifted students.
- Expand the spirit of competition and a high research ethic among talented future professionals in the field.

A total of 60 mentors were available through the program, in a variety of fields, and any one mentor might have worked with one to four students who shared the same interest. Lists of gifted students were sent to universities along with their profiles and interests, and mentors were assigned accordingly. Mentors, who received financial incentive for their efforts, worked with students for two months. This commitment included ongoing collaboration and

communication with students via email or phone throughout the week, as well as spending one full working day (from 8 a.m. to 2 p.m.) each month with students on the university campus. The program took place during the spring, or the second half of the academic year. At the end of the program, students were expected to present a final project they had developed either individually or as part of a group.

Quantitative Research Study Group

To achieve its aim, this study recruited 71 of the 100 Saudi students who participated in the FRP during the 2017 and 2018 academic years, 79.9% of whom were male and 21.1% were female. At the time of the study, in the spring of 2020, all of its participants had graduated high school and had been enrolled in college for at least one year. These students had diverse backgrounds, having attended various high schools in 7 different locations across the country—two of the schools were rural, and not all schools received equivalent services for gifted students throughout the school year. One district may have provided pullout programs for gifted students, for example, while another district may have offered weekend or monthly services. Even though gifted education provisions differed from one district to another, identification procedures were the same across the board.

Qualitative Research Study Group

Following the completion of the survey questionnaires and open-ended questions, the researcher conducted semi-structured interviews with 10 students in order to discuss the questionnaire items in detail and invite participants to contribute information and share their opinions. The criteria for selecting interviewees took into account the importance of talking to students from different universities who were studying a variety of majors, and of selecting members from the cohort of 2017 as well as 2018. Ultimately, interviewees included 10 male students from 3 universities, three of whom were majoring in engineering, two in medicine, three in business, and two of whom were in English program preparation (meaning they had not majored yet). Although it would certainly be important and interesting to explore the perspectives of female students toward the program, in consideration of appropriate cultural norms, as well as the assumption that male students would be more willing to communicate and express their thoughts with an interviewer of the same gender, the qualitative investigation phase of this study comprised only male participants.

Data Collection and Analysis

The quantitative findings were collected through a questionnaire created for the present study. Besides a general impression of the program, it included 4 additional dimensions of perceptions of the FRP: general perceptions (7 items), mentor relationships (11 items), level of rigor in learning (5 items), development of cognitive abilities (6 items), and development of research skills (7 items). To support the validity of the questionnaire, the Arabic version was reviewed by 3 professors (2 in education and 1 in psychology) and then modified according to their critiques. The reliability of the questionnaire was considered to be reliable. The results of the reliability coefficients (Cronbach's Alpha) for the questionnaire's dimensions were as follows: students' general perceptions 0.73, mentor relationships 0.9, level of rigor 0.70, development of cognitive abilities 0.8, and development of research skills 0.8. The measuring tool is a 5-point Likert type scale ranging from 1 (the most negative view) to 5 (the most positive view), and rated from Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4) to Agree Totally (5).

Procedure

All students who participated in the FRP received information about this study with their acceptance packets. Of the 100 total FRP participants in the 2017 and 2018 cohorts, 71 agreed to be part of this study, which took place over the course of several weeks during the spring of 2020. An online questionnaire was administered along with two open-ended questions: "How did you find the program?" and "What were the things that you wish to change about it?" Students completed the questionnaire in the time allotted, usually 10–15 minutes, and a total of 35 students responded to the two questions.

Individual follow-up interviews were conducted with 10 students, lasting approximately 16 to 22 minutes each. Before each interview, the researcher submitted information to participants conveying the aim and importance of the study. In an attempt to build trust, the researcher also specified to interviewees that their information and opinions would be kept confidential, and that they could recess or end the interview at any time. Questions on the semi-structured interview form were addressed verbally by the researcher to participants. Students were asked 1) to describe their experience in the Future Researcher Program, 2) how they thought they had benefited from mentorship, and 3) what aspects they would prefer to change or develop in the program. A recorder was used to maintain the flow of the interview and minimize obstruction to the participant's speech. Students were informed about this fact, and recordings

were made with their full knowledge and consent. Interviews were then transcribed and analyzed in order to identify repeating themes, and finally, the analysis was discussed with three of the interviewees and reviewed by a professor of gifted education.

Results

The study analyzed questionnaire and interview responses from 71 Saudi students who participated in a university-based mentorship program for gifted high schoolers during 2017 and 2018, in an effort to understand their general perceptions of the program, their views on their relationships with mentors, on the level of academic challenge they faced in the program, and on its effects on the development of their cognitive and research skills. Students' perceptions of these dimensions were measured by evaluating answers to survey questions on a Likert Scale ranging from 1 (representing the most negative view) to 5 (representing the most positive view). Perceptions were categorized into three levels: high, medium and low. Means for the high level start at 3.4, the medium level ranges from 1.8 to 3.4, and means for the low level sit at 1.8 and below. The reliability of each scale based on Cronbach's Alpha will be reviewed below, followed by a description of the results. Then, by evaluating correlations between perceptions of each sub-dimension and those of the program overall, we can identify which factors contribute most significantly to an effective mentorship program. After reviewing the descriptive quantitative results, the results of the qualitative research (i.e. open questions and interviews) will be presented.

Students' General Perceptions

The reliability for this scale was 0.73, based on Cronbach's Alpha, which is considered to be reliable. Results showed that the mean was 4.09, which is high and reflects a positive impression, according to the criteria of this study. With respect to the statements on this scale, the highest mean was associated with the statement "I see the Future Researcher Program as important for gifted students" ($M= 4.4$, $SD= 0.7$), followed by the statement "The program staff was helpful and supportive to me" ($M= 4.3$, $SD= 0.7$), as shown in appendix 1.

Level of Rigor

The reliability for this scale was 0.70, which is considered to be reliable. As shown in appendix 1, the mean of this scale was 3.93 ($SD= 0.41$), which is high. The highest was associated with the statement "The project required advanced thinking and planning skills," which had a mean of 4.1 ($SD= 0.7$), followed by the statement "Preparing the project's presentation and report was complicated," which had a mean of 4 ($SD= 0.8$). Compared to the results of the other scales, the mean of this scale was the lowest, but it remains significant with respect to how the level of rigor in the learning program has a positive influence on student perceptions.

Relationship with Mentor

The reliability for this scale was 0.9, which is a good indicator of its reliability. The results, displayed in Appendix 1, reveal that the mean for positive student perceptions of their mentors was the highest among all the scales ($M= 4.24$, $SD= 0.6$). More specifically, the highest means were associated with two statements: "The mentor was very knowledgeable and an expert in their field" ($M= 4.5$, $SD = 0.9$), and "The mentor expanded my understanding of science" ($M= 4.5$, $SD = 0.7$).

Program Development for Cognitive Abilities

The reliability of this scale was found to be good, with a score of 0.8. Appendix 1 shows a mean of 3.94 ($SD= .8$), which is a high rating according to the study's criteria. The highest mean among the detailed statements was associated with the statement "The program motivated me to deepen my understanding with learning," which had a mean of 4.1 ($SD= .1$), followed by the statement "I feel my scientific knowledge increased significantly after participating" ($M= 4$, $SD= 0.9$).

Program Development for Research Skills

Reliability was determined to be good for this scale as well, at 0.8 according to Cronbach's Alpha. Results indicated a mean of 3.95 and a standard deviation of 0.61. The highest mean was found to be associated with the statement "The project developed my research skills, overall," which hit a 4.2 ($SD= 0.8$), while the rest of the statements averaged around 3.9 (Appendix 1).

Correlation between General Perceptions and Sub-dimensions

After reviewing student perceptions of the program in general, and of the mentor, level of rigor, and development of the student's cognitive and research abilities in particular, the question arises: Which specific factors are most significantly related to positive perceptions of the program as a whole?

Table 1 illustrates the range of correlations between students' general perceptions and their perceptions of the various sub-dimensions. It appears to show a positive statistical correlation between a student's general perception of the program and their view of its specific aspects. This means that the more positive a student's perceptions are about the various dimensions of the program, the more likely their view of the program as a whole will be positive. More precisely, results show that a student's perception of the program in general is significantly related to their awareness of the way in which the program impacts their cognitive abilities. The coefficient of correlation for this factor, $r = .74$, was the highest among them all, followed by the correlation with student perceptions of the quality of mentor-mentee relationships ($r = .67$); next was the coefficient of correlation with research skill development ($r = .55$), and finally with that of level of rigor in learning ($r = .54$).

Table 1.

Correlation between Students' General Perceptions towards the Program in general, Relationship with Mentor, the Level of Rigor in Learning, and Program Development for Cognitive Abilities and Research Skills

Dimension	Pearson Correlation	General perceptions
General perceptions	Pearson Correlation	1
	Sig. (2-tailed)	
	N	71
Development in cognitive abilities	Pearson Correlation	.744**
	Sig. (2-tailed)	.000
	N	71
Challenge in learning	Pearson Correlation	.546**
	Sig. (2-tailed)	.000
	N	71
Development in research skills	Pearson Correlation	.559**
	Sig. (2-tailed)	.000
	N	70
University mentor	Pearson Correlation	.670**
	Sig. (2-tailed)	.000
	N	70

** Correlation is significant at the 0.01 level (2-tailed).

Open-ended Questions and Semi-structured Interviews

To further our understanding of the way gifted students experience and perceive mentorship program, two open-ended questions were added to the survey questionnaire: "How did you find the program?" and "What were the things that you wish to change about it?" Thirty-five students answered these questions, 21 of whom were female. Afterward, answers were analyzed by the researcher, along with another university professor who works in the field of gifted education, in order to identify repeating themes. Student responses indicated that they held overwhelmingly positive impressions of their experiences in the program. Interestingly, it was found that students raised a number of topics not appearing in the questionnaire, but which might give direction to further research, namely, the duration of the program and the possibility of e-mentoring.

Program Duration

Almost all of the student responses indicated that a two-month period for the program, with 4 in-person meetings, was insufficient, despite the availability of daily communication (Monday through Friday) with university mentors. Some students associated the period of mentoring with a deepening of their research interests and suggested the need for a longer timeframe saying, "at least we need three months to complete our research projects in the way we aspire." One student noted that "the program is supposed to be from the beginning of our enrollment in high school" (from the tenth grade), suggesting that a multi-year program would be most supportive and effective. Another student agreed, stating that "the only point that criticized the program, its duration was not sufficient." Some of the responses noted that the number of meetings at the university was too few to allow students to take advantage of the available resources: "[We] need more time to use [the laboratories] effectively, and I think it was supposed to be more than 4 meetings, such as that every Saturday and from the morning.

E-mentoring

Four students expressed a desire for e-mentoring in their responses, with the requests coming mostly from female students. One suggested that "the program may need to provide online meetings with the entire research group." Two students suggested e-mentoring as a solution to the issue of the program's short duration, with one saying, "If I could not attend one meeting this would affect my work substantially, but I believe that, in addition to the meetings at the university, the online meeting should be provided as an available option."

An analysis of interview responses confirmed the conclusions yielded by the quantitative data, with four themes emerging, namely, an increase in the confidence and competence of students as researchers, the significance of a supportive environment for the development of gifted students, the necessity of centering research projects around student interests, and the degree of influence of the university mentor.

Confidence and Competency in Research

In all ten interviews, students confirmed they felt the program contributed significantly to the development of their research skills, and that they feel more capable of independently acquiring information and accessing it in a scientific way. As one student reported, "Previously we were studying research not in depth and simple, but the program helped us refine and develop our research skills...because of the experiments we conducted." Another describes how, "After more than a year [since] the program, the most important benefit that I found was to develop my research skills and to know what the scientific method [is]." A third student notes that "after joining the university, university research project was almost not difficult, because during the program I was working with senior students at the university." Students also indicated that, as a result of the mentoring program, they now feel comfortable engaging with the same sources of scientific information as the professionals in their respective research fields do: "Google may not be a reliable source at all times, but Google Scholar and the scientific journals are the sources of researchers."

Again, most of the participants affirmed that the program made them feel more confident in their research skills, which is a crucial aim of any mentorship program directed at preparing gifted students to become professionals. "I previously thought that scientific research was difficult and for scientists," said one student, "but it became clear to me that it is challenging but possible." Responses indicated that because the program offered real research experience in a scientific field, it encouraged students to follow their interests and curiosities to become involved in some truly valuable university-level research. Even students who may have reported a negative experience overall, acknowledged benefitting in this way: "The fact [is] that the program has increased my enthusiasm for research, although my experience in general and the conditions were not good."

Supportive Environment

Another theme that emerged during the analysis of student interviews was an indication that the amount of support students received from those involved in the program contributed immensely to their positive perceptions. Crucial supporters included professors, mentors, program organizers, university mentors, and school administrators. As one respondent put it, "One of the positive points is the continuous support of others, and this is on the psychological or scientific level, we have always been encouraging." Another student told the interviewer that "The program coordinators (who are specialists in gifted education) represent an important positive role, they are like my friends." About his mentor, a satisfied student said, "he always encouraged me and accepted mistakes." Even students who did not have very positive experiences with the program as a whole confirmed their positive feelings toward those they were involved with, saying, "One of the things that impressed me and made me complete the program is the collaboration and interest of others." It was clear from student responses that the opportunity to form supportive relationships was an integral factor in their experience with and perceptions of their educational environment.

Student Interests

Four students mentioned the projects they worked on during the program were not necessarily in line with their own interests, primarily due to the fact that they were encouraged to work in groups with other students in the same field, e.g. engineering or agriculture, and because projects were chosen according to the desires of the group. These students reported a less positive impression of their experience than the others. "I was not very interested in the subject of the project from the beginning," said one student, adding "I thought it would be interesting over time, but it did not happen." Regarding the research he engaged in during the mentoring program, a student in the engineering field stated, "The project is not of my interest and I would not specialize in the future in this field." This sentiment was shared by several students whose projects were not within their field of interest, all of whom emphasized the program's need to be improved in this regard.

University Mentor

The results showed quite clearly that the role of university mentor was vital in shaping student perceptions of the program. Responses suggested several reasons for this, all centered around the mentors' personal skills. For example, students reported feeling encouraged by mentors who were available and helpful. "We were always able to communicate with the mentor with ease and we never hesitate to ask....He encourages you to [ask] questions and communicate with him," said one student. "If we have something, the mentor is often there with us and is interested in helping," said another.

Students agreed that one of the most positive and rewarding aspects of the program came from the interest their mentors showed in their work. One participant reported that "The mentor was communicating with us outside working hours to inquire about our research project"; another stated, "During our work at the university...the mentor [was] interested in helping us as much as possible." In contrast, a student who described his general experience with the program as "neutral" claimed, "The mentor did not show enough interest...he was not always ready and organized to work with us." This response confirms the assumption of this and other studies that a mentor's ability to connect and engage with their students is one of the most crucial elements contributing to positive student perceptions. One student recognized this phenomenon himself, remarking that "if both the mentor and the student were interested, I believe good results usually were produced."

It appears that mentors also reinforced positive student perceptions by bringing their experience and scientific competence to the table. "We work with an efficient person with extensive experience," one student said, noting "There is a difference between working with a mentor at the university, a researcher and a practitioner, and working at a school." Students had a generally positive attitude toward their mentors, who they considered to be rich sources of information.

Students also relayed positive feelings about their mentors based on the motivation and support they provided, both in terms of research ("[He] encourages you to be better as a researcher") and operationalization (mentors "urg[e] the completion of the project and its implementation"). Students reported that mentors "working with us as researchers in the field was inspiring"—that "this itself is wonderful." Another student recalled how "The mentor's confidence in my abilities motivated me." These responses confirm the assumption that students are motivated by both direct and indirect encouragement from their mentor, who serves simultaneously as resource and role model.

Discussion and Conclusion

This study aimed to fill several knowledge gaps within the literature of gifted education, specifically with respect to the role of mentorship in guiding and developing talented young minds as they begin to move into advanced academic and professional environments. To achieve this aim, it investigated the perceptions of gifted students who participated in a university-based mentorship program during high school, by evaluating their answers to 1) an online questionnaire, 2) two open-ended questions, and 3) an in-person interview where students were encouraged to share their impressions honestly. The study focused on their general perceptions of the program, as well as those of their university mentor, the level of rigor in their learning, and the extent to which the program developed their cognitive and research skills. Timing played a crucial dimension in this study because questionnaires and interviews were conducted after students had been enrolled in college for at least one year, giving them significant time to reflect on their experiences and the efficacy of the program.

A breakthrough in terms of research on gifted education in the Middle East, the results of this study indicated positive perceptions of the Future Researcher Program (FRP) among its participants, with one of them describing it as "a distinctive development in the gifted programs in the Kingdom." Students reported that the program helped them develop academic skills and improve achievement through its challenging independent studies curricula, which were based on student interests and conducted in an academic setting under the supervision of experts. Providing a curriculum that includes these elements is foundational to the success of gifted education because gifted students express a natural desire to be challenged as they learn and to seek complexity and depth in their studies (Coleman et al. 2015; Kitsantas et al. 2017; Potts, 2019). Research has found that in many cases exceptional students enjoy being asked to perform unique and thought-provoking tasks that apply their interests and passions. This study is no exception, finding that students who were involved in research projects less directly in line with their interests had less positive views of the program overall than those whose tasks were more closely related to their interests. This is a crucial theme for administrators of mentoring programs to bear in mind.

Overall, students reported a perceived improvement in their cognitive and research skills as a result of their participation in the mentoring program. This may be attributed to the diversity of educational opportunities, and to the experience of applying higher-level thinking and planning skills to real-world challenges and demands. It may also be attributed to the socialization process undertaken by students who are being initiated into a professional context under the supervision of a specialist. A mentor's expertise provides support as students broaden their understanding and develop advanced cognitive skills. Because learning is a social process that only makes sense in the context of social activity (McMahon, 1997), this itself is a vital experience. For this reason, the most effective mentors are those who prioritize responsiveness and who balance structure and challenge with joy and support. This study's findings also support those of Little et al. (2010) who showed that even though students participating in a three-week mentorship program entered it with high self-perceptions of their research skills, the program had raised those perceptions further. Similarly, students in the present study emphasized that although they had been enrolled in research programs during high school, the university-based mentoring program developed their research skill and confidence substantially. Relatedly, students reported that working with experts motivated them to put forth their best efforts. This supports previous claims from the literature and confirms that gifted students have a strong desire to work with instructors who they see as knowledgeable professionals in their field of interest.

Interview responses indicated that perhaps the most important component of an enrichment program may be the university mentors themselves. Clasen and Clasen (1997) hypothesized that even students already performing well academically could benefit from a relationship with a mentor, who can provide valuable direct guidance and serve as a model for professional achievement. A student's relationship with their instructor appears to play a crucial role in their perception of their educational environment in general. Researchers Hibert and Olenchak (2000) illustrated three categories of specific traits typically seen as favorable in a mentor. These include 1) openness and a non-judgmental approach, 2) a willingness to provide social—in addition to academic— support, and 3) an ability to effectively utilize intellectual strategies for encouraging gifted development. The present study found evidence to affirm these claims, as well as those of Powell (2018), who found that the type of mentor-mentee relationship—whether it is personal, academic, or both—is a significant determinant of student attitudes. In the case of the FRP experiment, students who reported less positive perceptions of the educational environment were the same as those who indicated less effective relationships with their instructors.

One new and unanticipated piece of information that emerged from student feedback was a broad desire to extend the timeframe of the program, allowing them more time to explore and expand the applications of their projects. Some also suggested mentorship could be provided, or at least supplemented, online, and that this may increase the benefit and convenience of the program. This suggestion is likely to be fruitful in the frame of Mamadov and Abdullah's 2014 study, which found that students involved in e-mentoring had high levels of motivation and desire, and thus were able to persevere and complete difficult tasks.

Recommendations

One of "the things that should be considered in preparing the program is to focus more on the student's interest and give him more time to expand his research scope," one respondent suggested. Considering the program's relatively short duration, some students reported feeling unable to pinpoint their area of interest due to lack of time: "The whole period was two months, and we have to present a project at the end of the program...so we rushed to define the research topic." Also, as two students suggested, e-mentoring should be provided as available options in addition to the meetings at the university. E-mentoring was found to increase levels of motivation and desire and so helps students to persevere and complete demanding tasks.

Limitations of Study

Beyond shedding valuable light on a number of issues central to educating gifted students, the present study has opened up new avenues for research as well. This study, for example, interviewed students after a period of time not less than a year, but it may also be useful to conduct a study that measures the effects of the program by evaluating perceptions both before and after joining. Likewise, while this study was limited to an examination of the experiences of students, it may be meaningful to explore the experiences of mentors and coordinators too, so as to identify and eliminate any difficulties that may hinder the operation of these programs. A final area of interest to researchers might be the characteristics common to effective mentors of gifted students, as this may help administrators better identify

instructors as they seek to create programs that will challenge, engage and support talented youth who are transitioning from high school to the academic and professional world.

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Appendix**Appendix 1.**

Mean and Standard Deviation of Students' Perceptions toward the Program in general, the University Mentor, Level of Rigor in Learning, Cognitive Development, and Research Skill Improvement

Dimension	Item	Mean	Standard Deviation	Count
General	I see the Future Researcher Program as important for gifted students.	4.4	.7	71
General	The program staff was helpful and supportive to me.	4.3	.8	71
General	The program increased my enthusiasm for enrollment into college.	4.2	1.1	71
General	I see the program as one of the most useful programs in high school.	3.7	1.0	71
General	The program increased my interest in the scientific field.	4.0	1.0	71
General	I enjoyed the program very much.	4.1	.9	71
General	The university offered of variety of informational resources.	4.0	1.1	71
General	General perceptions	4.09	.61	71
Cognitive	The program motivated me to deepen my understanding with learning.	4.1	1.0	71
Cognitive	The program improved my learning skills.	3.8	1.0	71
Cognitive	I feel my scientific knowledge increased significantly after participating.	4.0	.9	71
Cognitive	The project enhanced my overall academic understanding.	3.8	1.0	71
Cognitive	The project encouraged me to think creatively.	4.0	.9	71
Cognitive	Cognitive development	3.94	.79	71
Rigor	The program was tough overall.	3.8	.7	71
Rigor	Finding good ideas for my project was a complex process.	3.9	.7	71
Rigor	Developing and implementing the project was challenging.	3.7	.8	71
Rigor	Preparing the project's presentation and report was complicated.	4.0	.8	71
Rigor	The project required advanced thinking and planning skills.	4.1	.7	71
Rigor	Rigor in learning	3.93	.41	71
Research	The project developed my research skills, overall.	4.2	.8	71
Research	My competency in choosing research methods has increased.	3.9	.9	71
Research	My competency in making appropriate and meaningful hypotheses has increased.	3.9	.8	71
Research	I better understand the logic of testing the validity of hypotheses.	3.9	1.0	71
Research	The program enhanced my reading, writing and research skills.	3.8	.9	71
Research	My competency in analyzing and interpreting the data has increased.	3.9	.8	71
Research	Research skills	3.95	.61	71
Mentor	The mentor was very knowledgeable and an expert in their field.	4.5	.9	71
Mentor	The mentor expanded my understanding of science.	4.5	.7	71
Mentor	In general, the mentor was easygoing and friendly.	4.0	1.1	71
Mentor	The mentor was interested in my research.	3.8	.9	71
Mentor	The mentor was cooperative and supportive.	4.4	.8	71
Mentor	The mentor allocated enough time to work with me.	4.1	1.1	71
Mentor	The mentor was committed to providing instructions and guidelines.	4.3	1.0	71
Mentor	The mentor provided frequent feedback and suggestions.	4.1	1.0	71
Mentor	The mentor was respectful and humble.	4.3	.9	71
Mentor	The mentor respected my opinions and perspectives.	4.4	.8	71
Mentor	Overall, I would recommend working under the supervision of the mentor.	4.2	1.0	71
Mentor	University mentor	4.24	.65	71