Online learning, classroom quality, and student motivation: Perspectives from students, teachers, parents, and program staff

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Abstract
The purpose of this concurrent mixed-methods study was to assess the quality of online learning with a focus on student motivation in the context of a talent development program. Data were collected from 221 Indian students from fifth to tenth grades for three academic years during their participation in 14 online and 10 in-person courses. Students, teachers, and parents responded to a measure of classroom quality assessing five constructs—appeal, meaningfulness, academic self-efficacy, challenge, and choice. In addition, 41 online sessions were observed by program staff using an additional measure of instructional quality. Participants rated online learning to be highly supportive of learning motivation. No significant differences were observed in student motivation by program format, gender, or program level. Qualitative analysis revealed specific affordances and challenges in supporting student motivation in online learning. Implications in the context of out-of-school programs for students with intellectual gifts and talents are discussed.

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The COVID-19 pandemic propelled a global paradigm shift toward online learning (Fasching-Varner et al., 2020). Thus, several talent development programs have been recently moved to be online, requiring educators to hold them to the same quality standards as in-person programs. Talent development programs are supplemental interventions typically conducted outside of schools by experts using specialized curricula (Jarvin & Subotnik, 2015). These programs provide early exposure to a variety of domains and offer students opportunities to engage in challenging and appealing activities that broaden and deepen their learning (Corwith, 2018). Although these programs are typically conducted in-person, they can also be provided online, benefiting students in remote areas, or who have interests that transcend traditional academic subjects (Corwith, 2018). Despite many affordances, several teachers and students struggle with maintaining the same classroom quality and motivation in online learning (Sanderson & Greenberger, 2010). This presents a key research area in gifted education, especially for online programs. Therefore, this study aims to examine motivational constructs of classroom quality in an online talent development program for adolescents as perceived by students, teachers, parents, and program staff.

Theoretical framework

According to self-determination theory (SDT; Ryan & Deci, 2000), humans are optimally motivated when their psychological needs for competence, autonomy, and relatedness are met. When these needs are met in a classroom environment, students' intrinsic motivation to learn is catalyzed, resulting in high-quality learning and creativity. Some of the key components of motivation in a supplemental enrichment program are appeal, meaningfulness, academic self-efficacy, challenge, and choice (Wu et al., 2018).

Self-determination theory posits that students must experience perceived competence or *self-efficacy* for a task to maintain or enhance intrinsic motivation. Providing an optimum *challenge* in a classroom can, therefore, support intrinsic motivation. Moreover, self-efficacy perceptions must always be accompanied by a sense of autonomy so that the increased self-efficacy can result in enhanced intrinsic motivation. Providing a *choice* and opportunities for self-direction can support intrinsic motivation. However, intrinsic motivation is experienced only when the activities are intrinsically interesting for the learner. Unless the activities hold *appeal* through novelty, challenge, or esthetic value for an individual, that individual will not be intrinsically motivated to engage in that activity.

However, many learning activities are not inherently interesting. Therefore, to engage in less interesting activities, learners need to experience extrinsic motivation. According to SDT, to feel valued or connected to significant persons involved in a task such as peers, teachers, and family can support the development of extrinsic motivation (Ryan & Deci,

2000). This is known as a sense of *relatedness*. Students need to feel respected and cared for by the teacher to feel motivated to engage in learning activities.

Finally, another important motivational construct involving extrinsic motivation is *meaningfulness*. According to SDT, an individual must internalize the meaning and worth of an uninteresting behavior to fully internalize and regulate it. These internalized meanings then further support the needs for competence, relatedness, and autonomy.

In summary, to create a high-quality classroom that supports learning motivation, students should feel appropriately challenged and self-efficacious to engage in a learning activity. They should be allowed to make meaningful choices about their learning. Besides, they should be offered appealing content and a learning environment that is respectful and relatable to their daily lives.

Literature review

Online learning can be of two types, namely, synchronous and asynchronous, or a blend of the two (Hrastinski, 2008). Synchronous online learning involves real-time engagement, whereas asynchronous online learning formats are flexible regarding time and pace. Although both types may have unique affordances and challenges, they can have many commonalities. As such, fostering interaction is important to developing motivation and engagement in online learning. Effective online learning involves three types of interactions, namely, student-student, student-teacher, and student-content interactions (Moore, 1993).

Motivational enhancement is only possible when students with gifts and talents interact with peers, relatively new challenging tasks, and new technology tools (Housand & Housand, 2012). Student-centered online programs include authentic problems and support self-efficacy beliefs (Thomson, 2010). These programs are structured and move students progressively to open-ended inquiry (Ng & Nicholas, 2010). Students with gifts and talents seek challenge and enjoyment in online programs (Olszewski-Kubilius & Lee, 2004). A regular presence of teachers (Ng & Nicholas, 2010) and quantity and quality of feedback to students (Sanderson & Greenberger, 2010) are vital in motivating school-aged students in online learning. Communicating enthusiasm, praise, encouragement, and support are also critical to student motivation (Sanderson & Greenberger, 2010), which can be lost in online learning due to challenges in non-verbal communication (Olszewski-Kubilius & Lee, 2004).

Online learning can have many affordances for students with gifts and talents. Not only can it provide access to advanced courses beyond regular schools (Corwith, 2018) but it can also allow opportunities for new modes of learning (Thomson, 2010). Online learning can be useful in individualizing and differentiating course content and to better cater to individual interests, pace, and challenge levels of the students (Thomson, 2010). Besides, students in online programs can feel more in control of their learning, can enjoy more self-determination, and be more self-motivated and self-directed (Cavanaugh, 2007; Thomson, 2010).

However, online learning can also have certain limitations. Online learning requires a great deal of self-motivation and self-regulation, which can be a challenge for

unmotivated students with gifts and talents (Thomson, 2010). Further, online learning can limit student-student interaction, thereby, limiting their group involvement and social interactions (Thomson, 2010). Also, teachers can struggle to effectively integrate new technologies in the online environment (Sanderson & Greenberger, 2010).

Purpose of the study

Little is known about the classroom quality of synchronous online programs for students with gifts and talents and how they compare with an in-person format. We aim to examine motivational constructs of classroom quality (i.e., appeal, meaningfulness, academic self-efficacy, challenge, and choice) in an online talent development program for adolescents as perceived by students, teachers, parents, and program staff. We also aim to explore how online learning supports and impedes student motivation in an online program. Given the quantitative and qualitative nature of our study, we use a concurrent mixed-methods research design (Creswell & Clark, 2017). Such design is particularly appropriate in applied research involving formal program evaluation (Creswell & Clark, 2017). The questions that follow guided our study.

> RQ1. How do students, teachers, parents, and program staff perceive the classroom quality concerning support for appeal, meaningfulness, academic self-efficacy, challenge, and choice in the online talent development program?
>
> RQ2. How do student perceptions of classroom quality vary by program's delivery format, gender, and program level?
>
> RQ3. In what ways do the online sessions facilitate and impede classroom quality concerning student motivation?

We hypothesize no significant differences in perceptions of classroom quality in online and in-person formats, or by students' gender or level of the program they participate in. Together, the findings of these three questions will provide an integrated insight into motivational aspects of classroom quality in online learning. The findings will contribute to the ongoing global efforts to assess the effectiveness of online learning and will be particularly useful to gifted teachers and program administrators in supporting student motivation and maintaining high classroom quality.

Method

Context

This study was conducted at an out-of-school talent development program designed for adolescents with intellectual gifts and talents. The program is conducted at a psychology institute located in a Western Indian city. The year-long program consists of a variety of elective courses offering advanced content and is conducted over 25 weekend sessions and a 4-day residential summer camp. The program includes two age groups: (a) foundation program (fifth to seventh grades) and (b) advanced program (eighth to 10th

Table 1. Demographic characteristics of the participants in different program formats.

	Sample	
Characteristic	Online	In-person
Gender		
Female	53	46
Male	68	54
Program		
Level 1	25	—
Level 2	32	87
Level 3	—	13
Level 4	64	—
Students (total)	121	100
Teachers	12	—
Parents	65	—

grades). Each age group has two levels. In the foundation program (i.e., Levels 1 and 2), students learn skills in cognition, memory, creative thinking, logical reasoning, literary engagement, and self-regulated learning through several activity-based courses. The advanced program (i.e., Levels 3 and 4) aims to develop domain-specific mastery and exposes students to a variety of courses typically not offered in school curricula at that age (e.g., psychology and architectural creativity). Teachers with a specialization in gifted education facilitate the foundation program; however, subject experts are invited to teach the advanced program.

Participants

Participants consisted of 221 students (ages 11–16; 99 girls) studying in fifth to tenth grades. They came from urban middle-income families. Hundred students (43 girls) from Level 2 and Level 3 participated in the in-person format through 10 courses conducted in the years 2018–2019 and 2019–2020. During the COVID-19 pandemic, the program was moved to an online format with synchronous engagement hosted via Google Meet. Hundred and 21 students (53 girls) participated in the online format through 14 courses in the year 2020–2021. With them, 65 parents participated in the annual assessment of the program. Furthermore, 12 teachers (8 female teachers) who taught the online courses participated in the program assessment. Finally, three female members of the program staff collected classroom observations to get additional insight into the online classroom quality. Table 1 summarizes the demographic characteristics of participants.

Sampling procedure and power. All students enrolled in the program were included in the study. The formal identification process included taking one of the many standardized intelligence tests (i.e., Standard Progressive Matrices, Indian Child Intelligence Test, JPIP *Prajna Kasoti*) or providing a self-nomination form. *A priori* power analysis for two-way

Table 2. Five constructs in student perceptions of classroom quality (Gentry & Owen, 2004; Wu et al., 2018).

Constructs	Description
Appeal	It combines interest and enjoyment. It indicates a pleasant, safe, and satisfying learning environment that encourages smiles, positively engages students, and reflects their preferences for topics and activities
Meaningfulness	When content and methods have relevance to students' lives and are significant, important, connected, and worth caring about, then meaningfulness has been achieved.
Academic self-efficacy	It reflects students' perceived confidence in performing important classroom learning behaviors
Challenge	It involves rigor, depth, and complexity and is at the intersection of content, process, product, and audience. The optimal challenge is based on individuals, engaging them in effective learning
Choice	It involves empowering students to direct and make important decisions about their learning

multivariate analysis of variance (MANOVA) for five dependent variables and two groups indicated a sample size of 140 was required at minimum to obtain a statistical power of .80 calculated at the Type I error rate of .05 and medium effect size (η_p^2 = .06). The MANOVAs in this study involved over 300 data points, providing adequate power to detect medium effects for the given condition. However, it lacked the power to detect smaller effects (η_p^2 < .02).

Measures

Student perceptions of classroom quality. The *Student Perceptions of Classroom Quality* measure (SPOCQ; Gentry & Owen, 2004) consists of 34 items measuring five motivational constructs, namely, appeal, meaningfulness, academic self-efficacy, challenge, and choice (see Table 2 for descriptions), and four items measuring causal attributions. For each item, students rated their perceptions about classroom quality using a five-point Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*). A recent study involving students with gifts and talents in an enrichment program (Wu et al., 2018) revealed that the model moderately fit the data, χ^2 = 3600.016 (*p* < .0001), RMSEA = 0.078 (90% CI = [0.076, 0.080]), and CFI = 0.823. Internal consistency reliabilities in this study ranged from .82 to .90.

Teacher perceptions of classroom quality. The *Teacher Perceptions of Classroom Quality* measure (Seward, 2017) consists of 38 items parallel to SPOCQ measuring teachers' perceptions of classroom quality. For each item, teachers responded to a five-point Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Parent perceptions of classroom quality. Based on SPOCQ, we designed the *Parent Perceptions of Classroom Quality* (P-POCQ) measure to evaluate parental perceptions of classroom quality. This instrument consists of 38 items parallel to SPOCQ, and the parents provided their ratings on a five-point Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency reliabilities in this study ranged from .82 to .90.

Course feedback form. The *Course Feedback Form,* the instrument we developed to collect additional feedback from students, parents, and teachers, consisted of two parts. First, participants rated various aspects of the classroom experience on a five-point Likert-type scale from 1 (*Poor*) to 5 (*Excellent*). These items included ratings on the overall classroom experience, teacher's teaching and communication skills, warmth and friendliness in the teacher's classroom behavior, teacher's respect for every member in the class, and student's level of comfort with the teacher. Second, participants responded to four open-ended questions given below: (a) What has been your greatest learning or take away from this course, (b) What were some of the challenges you faced in this course, (c) What was the single most memorable moment you experienced during the sessions? Explain why that experience is important to you, and (d) Give your suggestions to make this course more meaningful to students.

Teacher observation form—revised. The *Teacher Observation Form—Revised* (TOF-R; Peters & Gates, 2010) assesses the overall quality of classroom instruction using a 12-item observation protocol. Select items include content coverage, motivational techniques, opportunities for self-determination, and student involvement. Observers rate teachers on a seven-point Likert-type scale from 1 (*Unacceptable*) to 7 (*Excellent*) or 0 (*Unobserved*). Peters and Gates (2010) reported a strong item-total correlation ranging from .54 to .84 and an overall alpha reliability estimate of .95.

Research design

We used a concurrent mixed-methods research design (Creswell & Clark, 2017) to leverage the affordances of quantitative and qualitative analyses. We collected data from students, teachers, parents, and program staff using quantitative and qualitative survey measures and an observation protocol to examine the aspects of classroom quality in online learning. Ultimately, we triangulated the results from the quantitative and qualitative analyses to explain the level of classroom quality perceived by the participants and in what ways did the program support and impede student motivation.

Data collection

We collected data from students regarding their participation in 10 in-person and 14 online courses during three academic years (2018–2019, 2019–2020, 2020–2021). Twenty-six students attended the program for more than 1 year. During the in-person format in 2018–2019 and 2019–2020, students participated in an annual assessment of multiple courses they had attended in that year providing a combined assessment of courses (100

responses). However, during the online format in 2020–2021, students evaluated each of the courses separately (304 responses). Students responded to SPOCQ and the Course Feedback sent to them via Google Forms. Additionally, we collected data from teachers during online courses using T-POCQ and the Course Feedback Form (12 responses, each). We also observed these teachers in five online courses (41 observations) using TOF-R to get additional insight into the classroom quality. Finally, we collected data from 65 parents using P-POCQ and the Course Feedback Form to learn about their perceptions of classroom quality in online learning.

Data analysis

Quantitative analysis. We began with descriptive analyses of data collected from students, teachers, parents, and program staff. We examined descriptive statistics for data collected using SPOCQ, T-POCQ, P-POCQ, TOF-R, and the Course Feedback Form. Next, we performed inferential analyses on the SPOCQ data using a MANOVA to examine the effects of gender, program's delivery format, and different levels of the program on the five motivational constructs of classroom quality. Appeal, meaningfulness, academic self-efficacy, challenge, and choice served as the dependent variables. Because the dependent variables are moderately intercorrelated (Gentry & Owen, 2004), MANOVA is appropriate for this analysis.

Qualitative analysis. Concurrently, we conducted a basic-descriptive qualitative analysis (Thomas, 2006) of 304 student responses to the four open-ended questions in the Course Feedback Form. In the first step, four members of the research team read the responses line by line to familiarize themselves with the data. In addition, they also highlighted the excerpts relevant to the study, separating them from other excerpts. Next, they coded the highlighted responses deductively under five constructs, namely, appeal, meaningfulness, academic self-efficacy, challenge, and choice using the definitions provided by Gentry and Owen (2004; see Table 2). They also referred to the specific items in the SPOCQ instrument under these five constructs.

In the second step, the lead qualitative researcher and second author completed peer debriefing with the first author in which they reviewed the coding of a random sample of data excerpts (about 15% of the total excerpts) and made necessary changes to enhance the accuracy of their coding. In this process, they identified relatedness as an additional theme that was not covered by SPOCQ.

In the third step, the lead qualitative researcher and second author completed a full review of the coding for the entire data set using the consensus approach. Consequently, they identified 78 references for appeal, 49 for meaningfulness, 22 for academic self-efficacy, 25 for challenge, 16 for choice, and 48 for relatedness. In the final step, the lead qualitative researcher developed subthemes concerning motivational affordances and challenges under each of the prime categories using the constant comparison method (Charmaz, 2006). She discussed these subthemes with the first and second authors before producing the final report.

Table 3. Descriptive statistics for student, teacher, and parent perceptions of classroom quality.

Variable	Students (online) M (SD)	Students (in-person) M (SD)	Teachers (online) M (SD)	Parents (online) M (SD)
Appeal	4.41 (0.68)	4.49 (0.55)	4.56 (0.39)	3.91 (0.70)
Meaningfulness	4.27 (0.70)	4.30 (0.49)	4.36 (0.44)	4.11 (0.59)
Academic self-efficacy	4.02 (0.65)	4.15 (0.43)	4.25 (0.45)	3.95 (0.61)
Challenge	4.26 (0.68)	4.25 (0.50)	4.30 (0.53)	4.13 (0.63)
Choice	4.31 (0.67)	4.38 (0.44)	4.27 (0.45)	4.14 (0.59)
Observations	304	100	14	65

Note. The ratings are on a scale from 1 to 5.

Trustworthiness. Various measures were taken to enhance the trustworthiness of the qualitative analysis. The research team was familiar with the research context and participants as they were associated with the program for a minimum of 3 years, which enhanced the credibility of the study. The language used in the open-ended survey questions was simple and straightforward. This ensured the participants understood the questions well. Furthermore, we have adequately described the context and participants to enhance the transferability of the qualitative findings to a different context. In addition, we have described the method of qualitative analysis in detail and provided numerous participant quotes to ensure the transparency of the study. We also maintained an audit trail throughout the study. Most importantly, two or more researchers were involved in each of the steps of the data analysis. We conducted multiple rounds of peer debriefing, especially while reviewing the codes and finalizing the report. These measures enhanced the rigor of the study and ensured consistency in the analysis across the team members. Finally, we have provided a positionality statement below to further improve the re-flexivity of the study.

Positionality Statement. All authors are from economically middle-class, urban, Marathi-speaking families in India. They have been associated with the program ex-amined in this study for at least 3 years. The first author is the founder of the program but is not involved in its daily activities. He is a final-year Ph.D. candidate in Gifted, Creative, and Talented Studies studying in the USA. Other authors are current members of the program staff. They hold a post-graduate diploma in gifted education. All authors have three to 14 of experience teaching children with gifts and talents.

Results

Descriptive statistics

Students', teachers', and parents' perceptions of classroom quality. Table 3 provides de-scriptive statistics for perceptions of classroom quality as reported by students, teachers,

and parents. Overall, students perceived the online and in-person classes to have high classroom quality as indicated by mean scores greater than four on a scale from 1 to 5 on all five constructs measured by SPOCQ. Regardless of the delivery format, students rated the classes the highest for appeal and the lowest for self-efficacy. On all the constructs, students rated the classroom quality of online classes slightly lower than the in-person format, except for the challenge construct.

Similar to students, teachers perceived the online classes to have high classroom quality. Overall, T-POCQ mean scores for the five motivational constructs ranged from 4.25 (0.45) for academic self-efficacy to 4.56 (0.39) for appeal on a scale from 1 to 5. Also, teachers perceived the five constructs similarly to that of the students placing the appeal construct at the top and the self-efficacy construct at the bottom. Except for the construct of choice, teachers, compared to the students, rated the classroom quality to be slightly higher.

Parents also rated the online classes to be of high quality ($M = 3.91–4.13$); however, their mean scores were consistently lower than that of the students and teachers. Parents rated online classes the highest for choice. Further, parents rated classes the lowest for appeal, which contradicts ratings from students and teachers who evaluated classes the highest for appeal.

Program staff's perceptions of classroom quality. Using TOF-R, the program staff observed 12 teachers in five online classes (41 observations) to get additional insight into the classroom quality (see Table 4). Overall, we found high ratings for content coverage, clarity of instruction, student involvement in a variety of experiences, and emphasis on higher-level thinking skills ($M > 6$). Mean scores for content coverage ranged from 4.50 (0.58) to 7.00 (0.00), which indicated that the course content was advanced and appeared to provide an appropriate level of challenge to students with gifts and talents. Similarly, the clarity of instruction ratings ranged from 4.50 (1.00) to 6.75 (0.50), suggesting that the verbal and non-verbal communication in the classroom was enriching, and students learning was evident. Correspondingly, the mean scores for student involvement in a variety of experiences were high, ranging from 5.00 (0.00) to 6.33 (0.65), which indicated students were involved in a variety of activities, problem-solving processes, and small group discussions. Finally, high ratings for an emphasis on higher-level thinking skills ($M = 5.25$ (0.50) to 6.17 (0.58)) signified that the course provided students with a thought-provoking and stimulating curriculum.

On the contrary, we found comparatively low mean scores for classroom technology, opportunities for self-determination, and creativity. The mean scores for classroom technology were moderately low for all observed courses, ranging from 3.78 (1.99) to 5.50 (0.71), suggesting that the observed courses lacked the appropriate use of technology and the utilization of audio-visual materials in the instruction. Similarly, the aspect of opportunities for self-determination received comparatively low mean scores, ranging from a category of *not observed* to 4.67 (1.15) to 5.29 (0.49), which indicated a lack of opportunities in the observed online classes to accommodate student choices and interests. Likewise, the means scores for emphasis on creativity were relatively low, ranging from 5.00 (0.00) to 5.73 (0.47), signifying that the courses lacked opportunities to develop

Table 4. Descriptive statistics for classroom observations of teachers in online classes.

Variable	ADM M (SD)	LC M (SD)	ADSP M (SD)	P M (SD)	LR M (SD)	Total M (SD)
Content coverage	6.50 (0.52)	6.27 (0.79)	6.20 (0.79)	7.00 (0.00)	4.50 (0.58)	6.22 (0.88)
Clarity of instruction	6.25 (0.75)	6.18 (0.40)	6.30 (0.48)	6.75 (0.50)	4.50 (1.00)	6.12 (0.81)
Motivational techniques	5.83 (0.72)	5.64 (0.50)	5.60 (0.97)	6.00 (0.00)	4.75 (0.50)	5.63 (0.73)
Pedagogy techniques	6.25 (0.62)	5.18 (0.40)	5.50 (0.53)	6.25 (0.50)	4.75 (0.50)	5.63 (0.73)
Opportunities for self-determination	5.29 (0.49)	5.00 (0.47)	4.86 (0.69)	4.67 (1.15)	-	5.00 (0.62)
Student involvement	6.33 (0.65)	5.82 (0.87)	5.90 (0.74)	6.25 (0.50)	5.00 (0.00)	5.95 (0.77)
Interaction	5.92 (0.67)	5.64 (0.67)	5.80 (0.42)	6.75 (0.50)	5.00 (0.82)	5.80 (0.71)
Opportunity for student follow up	6.00 (0.45)	6.18 (0.40)	5.50 (0.71)	6.00 (0.00)	5.00 (0.00)	5.83 (0.59)
Higher-level thinking skills	6.17 (0.58)	5.36 (0.50)	6.10 (0.57)	6.00 (0.82)	5.25 (0.50)	5.83 (0.67)
Creativity	5.55 (0.52)	5.73 (0.47)	5.20 (0.79)	5.50 (0.58)	5.00 (0.00)	5.45 (0.60)
Lesson plans	5.92 (0.67)	5.55 (0.52)	5.50 (0.71)	6.00 (0.00)	4.25 (0.50)	5.56 (0.74)
Classroom technology	4.75 (1.48)	3.78 (1.99)	5.50 (0.71)	4.75 (0.50)	4.00 (0.00)	4.64 (1.42)
Observations	12	11	10	4	4	41

Note. ADM = Advanced Mathematics, ADSP = Advanced Science – Physics, LC = Language and Creativity, LR = Logical Reasoning, P = Psychology. The ratings are on a scale from 1 to 7.

creative thinking skills by encouraging students to take risks and by modeling creative behavior in the classroom.

Additional aspects of classroom quality. Finally, we computed descriptive statistics for five items in the Course Feedback Form, collected from students, teachers, and parents (see Table 5). Overall, the mean scores were high on all five items ($M > 4$). Students—both in online and in-person learning format and parents and teachers rated the overall classroom experience to be excellent, with mean scores ranging from 4.09 (1.01) to 4.50 (0.52). The mean score for the variable of respect for every member was rated the highest by students, both for online ($M = 4.81$, $SD = 0.51$) and in-person ($M = 4.58$, $SD = 0.79$) classes, teachers ($M = 4.57$, SD= 0.51), and parents ($M = 4.75$, $SD = 0.50$). We observed that the teachers who taught online classes rated themselves relatively low for teaching and communication skills ($M = 4.21$, $SD = 0.70$), but students in the online learning format

Table 5. Descriptive statistics for additional aspects of classroom quality as rated by students, teachers, and parents.

Variable	Students (online) M (SD)	Students (in-person) M (SD)	Teachers (online) M (SD)	Parents (online) M (SD)
Overall classroom experience	4.43 (0.73)	4.09 (1.01)	4.50 (0.52)	4.25 (0.69)
Teacher's teaching and communication skills	4.67 (0.64)	4.48 (0.87)	4.21 (0.70)	4.57 (0.59)
Warmth and friendliness of the teacher	4.77 (0.53)	4.45 (0.94)	4.50 (0.65)	4.75 (0.47)
Respect for every member	4.81 (0.51)	4.58 (0.79)	4.57 (0.51)	4.75 (0.50)
Level of comfort with the teacher	4.50 (0.77)	4.33 (1.08)	4.07 (0.73)	4.52 (0.66)
Observations	304	33	14	65

Note. The ratings are on a scale from 1 to 5.

rated it excellent ($M = 4.67$, $SD = 0.64$). Similarly, teachers rated themselves relatively low for the level of comfort students felt with the teacher ($M = 4.07$, $SD = 0.73$), but students and parents rated this parameter as excellent ($M \geq 4.50$) in the online learning format.

Inferential statistics

Are there any significant differences in student perceptions of appeal, meaningfulness, academic self-efficacy, challenge, and choice, by gender and program's delivery format?. We conducted a two-way MANOVA to examine the effect of gender [male, female] and program's delivery format [online, in-person] on student perceptions of appeal, meaningfulness, academic self-efficacy, challenge, and choice. We checked data assumptions and found the multivariate normality assumption was violated (maximum Mahalanobis distance statistics = 48.285). However, each group of five independent * two dependent variables consisted of more than 30 observations, indicating an adequate sample for multivariate analysis. The assumption for the linear relationship between the pairs of variables for each group was largely met as inspected from the scatter plot matrix. Moderate correlations among the dependent variables indicated the multicollinearity assumption was met. Further, Box's M test for equality of covariance matrices was significant ($p < .001$); therefore, we examined the equality of error variances using separate Levene's tests. The results indicated equal variances across groups for all dependent variables ($p > .05$). Given the robustness of MANOVA for moderately large samples (i.e., group sizes >30), we found MANOVA to be appropriate for further analysis. In addition, we used Pillai's Trace test, which is considered to be the most robust statistic, especially when some of the MANOVA assumptions are not met.

     This MANOVA revealed no significant main effects for gender or the program's delivery format, nor was there an interaction between gender and the program's delivery

Table 6. Multivariate effects of gender and program's delivery format.

Effect	Pillai's Trace	F	Hypothesis df	Error df	p	η_p^2
Gender	.014	1.156	5	395	.330	.014
Format	.024	1.980	5	395	.081	.024
Gender * format	.017	1.351	5	395	.242	.017

format (see Table 6). Thus, student perceptions of the motivational constructs of classroom quality do not appear to vary in online and in-person formats and by gender.

Are there any significant differences in student perceptions of appeal, meaningfulness, academic self-efficacy, challenge, and choice, by gender and by participation in different program levels conducted in an online format?. We conducted a two-way MANOVA to examine the effect of gender [male, female] and the program level [Level 1, Level 2, Level 4] on student perceptions of appeal, meaningfulness, academic self-efficacy, challenge, and choice in online learning. We checked data assumptions and found MANOVA to be appropriate for further analysis. This MANOVA revealed only a significant main effect of program level on the mean scores of dependent variables, $F(10, 588) = 2.265$, $p = .013$, Pillai's Trace = .074, $\eta_p^2 = .037$ (see Table 7), suggesting a small effect (Cohen, 1988). However, this significance was not of practical interest given that program level accounted for only 3.7% of the total SPOCQ score variation. The *post-hoc* analysis confirmed this inference as it revealed no significant mean differences for any of the motivational constructs between any pairs of the three program levels. Further, there was no significant main effect for gender, nor was there an interaction between gender and the program's level. Thus, student perceptions of the motivational constructs of classroom quality do not seem to vary by gender and the level of the program they participate in.

Qualitative findings

We analyzed students' responses to open-ended questions in the Course Feedback Form to learn about their perceptions of classroom quality in online courses. The qualitative results are presented in six motivational themes, namely, appeal, meaningfulness, academic self-efficacy, challenge, choice, and relatedness. Subthemes under each of the themes revealed the affordances and challenges of online learning. Table 8 provides additional illustrative quotes.

Appeal. The student participants perceived the online courses as providing enriched content in appealing and pleasurable ways. We identified three subthemes related to appeal, namely, *enjoyment*, *novelty*, and *change in perspective*.

Enjoyment. Participants described their experiences as "memorable," "exciting," "amazing," "knowledgeable," and "informative." Examples include, "I enjoyed writing my own [story]" (21K4G11), and "[Random word stimulation session] was quite enjoyable" (21K1B09).

Table 7. Multivariate effects of gender and program level.

Effect	Pillai's Trace	F	Hypothesis df	Error df	p	η_p^2
Gender	.022	1.300	5	293	.264	.022
Program level	.074	2.265	10	588	.013*	.037
Gender * program level	.036	1.066	10	588	.386	.018

*$p < .05$.

Table 8. Illustrative quotes for select constructs.

Illustrative quote

Appeal
"It was interesting as it was different from the syllabus." (21K1G01)
"I got an insight into what exactly is chemistry at higher levels." (21K4G02)
"I mean I used to hate it before but now I have actually started liking it." (21K4G16)
Challenge
"I think this creative thinking module has an experience of taking your brain further." (21K1B14)
"Yes, of course, this made me think a lot...And use my brain at every single moment!!!" (21K2G02)
"I needed to think very hard ....it was a good type of challenge." (21K2B03)
Meaningfulness
"It was finding routes on the maps because the next time I go out, I will be more confident to find a way." (21K1B21)
"I am reading five famous books, and I used the reading skill a lot." (21K1G07)
"I learned how to tackle the problems… I can see its use in my future." (21K4B12)
Academic self-efficacy
"When I gave the correct answer, I was happy that I was at the other student's level." (21K1B13)
"We were given 20 words to learn and with classification, I could tell them all." (21K1B03)
"I have realized that I can write poems." (21K4B10)
Relatedness
"… when I was doing my project. I made new friends and understood their way of looking at things." (21K2B18)
"Sessions were online, it was difficult and lack of in-person touch." (21K4G02)

Novelty. Participants reported that they gained novel experiences. Sometimes the courses surpassed the scope of the prescribed academic curriculum content they learn in their regular school and provided advanced learning opportunities. For instance, a student wrote, "I am so happy because I had never heard about binary numbers before" (21K2G03). Another girl wrote, "[The cognition course] was interesting as it was different from the [school] syllabus" (21K1G01).

Change in Perspective. Higher grade students (8th to 10th) seemed more open to new experiences; they developed a positive attitude toward subjects and worked on their biases about certain topics. Comments such as "… I experienced a new face of maths," (21K4B06) and "Chemistry is not boring like l heard from many students," (21K4G07)

indicated that participants became excited about learning and were eager to explore the subjects learned in the program later at the college level. A participant from the Psychology course wrote, "… I am planning to study further in psychology [after high school]" (21K4B10).

Overall, participants reported they found the courses and the program appealing, enjoyable, and exciting.

Meaningfulness. The course content seemed to help participants to prepare better for school projects and various other academic tasks and competitions. We identified two subthemes related to meaningfulness, namely, *knowledge application* and *problem solving*.

Knowledge Application. Participants could establish connections between the class content and their immediate world (e.g., school and home) and sometimes with the outside world. One boy wrote, "Creative thinking activity helped me in many competitions and daily life" (21K2B03). A girl reported, "I can now apply the things that I learned in the class to the real world" (21K1G02). Some participants reported they could understand difficult concepts gained in these sessions after they got an opportunity to apply them in real life.

Problem Solving. Participants provided evidence that the online courses were able to create meaningful experiences as they could think of innovative solutions to outside problems by relating concepts learned in the class. A participant wrote, "… there were a lot of projects where the materials were not available at my house so I (used) alternatives" (21K2B09). Another boy commented, "I compared the science behind chemistry with day-to-day things and social issues" (21K4B22).

Academic self-efficacy. In the online courses, teachers made attempts at supporting students' academic self-efficacy by providing them opportunities to explore various things, appreciating their efforts and willing participation in the sessions, and providing feedback. We identified two subthemes related to academic self-efficacy, namely, *mastery experience* and *appreciation*.

Mastery Experience. Participants reported that they felt motivated when they learned that they could perform a task. It increased their likelihood of picking up a similar task, activity, or subject. Participant comments include, "I felt confident as I could answer questions asked by the facilitator," "the class strengthened my belief that I can learn anything." A boy wrote, "… [Now] I am capable of [doing] that particular task" (21K2B16). Some participants were amazed to discover their potential. For instance, after learning note-taking skills in a course, a participant commented, "I fit such a big chapter on a piece of paper, knowing that I can reduce it further" (21K2B17).

Appreciation. Teachers appreciating students' efforts and praising their work led to a sense of competence in participants. Consequently, participants described themselves as "competent," "capable," and "feeling accomplished." For instance, a participant commented, "XYZ sir praised me. … This was important for me because it encouraged me to never stop" (21K4B16). Another boy said, "the moment when ma'am appreciated my

work, I felt proud of my work" (21K1B10). Overall, the experiences in the program helped participants to believe in their abilities.

Challenge. The courses were aimed at providing challenging curricula. Thus, it was unsurprising that many participants commented on it. Participants wrote, "It was an experience of taking the brain further," "thinking harder than usual," and "tricky yet fun." We identified two subthemes related to classroom challenge, namely, *intellectually stimulating learning*, and *complexity with fun*.

Intellectually Stimulating Learning. Students reported that the courses triggered their thought processes by providing an appropriate level of challenge. A participant wrote, "In this module, I had to think very deeply at some points" (21K4G16). Although stating how assignments met the expected level of complexity one boy narrated, "The assignments were tricky enough" (21K2B11). Participants reported they had to think differently in the courses. A participant wrote, "(For the survey project) I needed to think a little differently to set the hypothesis and work on it" (21K4B13).

Complexity with Fun. Participants described the courses as more challenging than regular school and as involving advanced-level content requiring higher-order thinking skills. Participants commented, "The questions the facilitator asked were challenging, but they were also fun" (21K1B15), "Timelines were a challenge for me. Also, group work and analysis were fun and challenging" (21K2G08), "I like the way we learn different and difficult things simply by having fun" (21K1G08). This indicated that the students were thrilled to grasp advanced-level concepts and information in fun ways and without much simplification.

However, at times participants found activities to be difficult. One girl reported, "The direction activity was confusing and hard" (21K1G06). Specifically, the advanced mathematics program offered to Level 4 participants was perceived as hard. Their feedback suggested that the course involved "too much thinking," was "hard to understand," and "lacked time for completion of assignments." For instance, a boy commented, "I did not get the problems, and it annoyed me a lot" (21K4B12). A girl reported, "I could hardly solve any puzzles and sums" (21K4G24).

Choice. The online courses attempted to give students choices in many ways such as letting participants choose their topic for assignments/projects, using interactive methods of delivering content, and letting advanced-level participants decide which topics to study in-depth. In general, providing participants a choice in their learning helped to make it a joyous experience for participants. This theme has the fewest references ($n = 16$), and we identified one subtheme, namely, *diverse experiences and exposures.*

Diverse Experiences and Exposure. Participants reported that they were given a variety of choices during the learning process, which developed in them a sense of autonomy and motivated them to take responsibility for their learning. Most of the participants enjoyed quizzes, games, riddles, and videos instead of PowerPoint presentations. Another girl wrote, "Videos shown were a change from the PowerPoint presentations" (21K4G06). Teachers provided opportunities for participants to express themselves in the classroom.

One of the participants wrote, "*Tai* [Teacher] gives time to everyone [to speak] in the class" (21K1B09). Participants tended to perceive it as encouraging as they were heard.

The analysis also revealed a few limitations in providing choice. Participants suggested that the courses should include more hands-on activities and practical experiences, provide more variety in tasks, and incorporate activity-based homework. One girl wrote, "[The course] may need more hands-on activities as they make it better and easier for students to understand the larger theory" (21K4G14). Another girl wrote, "I think that different types of activities should be conducted in 1 day, otherwise I get bored" (21K1G07).

Relatedness. Participants often commented about their interactions with teachers and other students. Several comments highlighted the importance of interpersonal relationships. Participants also described how online learning resulted in a lack of face-to-face teacher communication. Online sessions also felt longer than in-person sessions.

Interpersonal Relationships. The program offered a conducive environment to students, which helped to build a sense of relatedness between students and teachers and among students. Participants specified that they loved the way teachers taught different courses. They also reported experiencing pleasure when involved in group tasks and presentations. Illustrious quotes include, "My ma'am [Teacher] was a very good teacher and very kid-friendly" (21K1B09), "Listening to my friends about their views on the activities was very memorable to me" (21K2B05), "… our *Tai* [Teacher] congratulated us for making a logo. It was important to me as I felt a feeling of self-responsibility, togetherness" (21K2G05).

Lack of Face-to-Face Interaction. Overall, though participants engaged themselves in the online mode of classes, they felt a genuine need for in-person sessions for various reasons. Participants perceived they would have better grasped difficult topics in an in-person mode. For example, a participant in the Advanced Mathematics course wrote, "…being conducted offline, students could have understood them (sessions) better" (21K4B27).

Duration of the Sessions. In the beginning, long online session hours were challenging for participants. One girl suggested, "Take it offline or reduce the time" (21K1G10). A participant complained, "Sometimes I was distracted due to long sessions" (21K1B07). "It would have been more fun if this was conducted offline" (21K2B04). Sometimes, participants missed important topics due to Internet connectivity issues. A girl wrote, "…internet connectivity (was a challenge). It would have been more effective, and grasping would have been easy if offline sessions were conducted" (21K4G10).

Discussion

Triangulating of findings from students, parents, teachers, and program staff suggests that an online talent development program can have high classroom quality concerning learning motivation. We hypothesized no differences in SPOCQ between online and in-person formats, or by gender or program level. Although students rated the online program slightly lower than the in-person program, statistical analysis revealed no

significant differences between their means scores of classroom quality, providing support to our hypothesis. This result is consistent with prior studies that indicated online programs can generally be effective for students with gifts and talents (Ng & Nicholas, 2010; Thomson, 2010). Besides, our study adds new evidence in support of the effectiveness of online enrichment programs by comparing perceived classroom quality of online versus in-person formats.

Furthermore, we found no effects of gender and program level on students' perceptions of classroom quality, which provided support to our hypothesis. Thus, it seems online learning may not be perceived differently by female and male students and those participating at different levels in the program. Program level can be considered as a proxy for student age. Thus, students from a range of adolescent years may not perceive an online enrichment program differently. These findings are consistent with the findings of Gentry and Owen (2004) who found no gender and grade-level differences in SPOCQ ratings of middle and high school students in the United States.

Students rated appeal, meaningfulness, academic self-efficacy, challenge, and choice to be high. This finding is consistent with previous studies that used the measure of SPOCQ with students with gifts and talents (Gentry & Owen, 2004; Wu et al., 2018). High ratings on appeal and challenge are unsurprising given that talent development programs strive to provide rigorous and challenging learning experiences in a fun way (Corwith, 2018). Students rated academic self-efficacy the lowest among SPOCQ subscales for online and in-person formats. Parents and teachers also rated it to be among the lowest, triangulating the finding. Item-wise inspection revealed students rated lowest on item 21 ("I am good at answering questions in this class") and item 28 ("I am good at taking tests in this class"). Although item 28 is irrelevant to the enrichment program in this study, item 21 calls for action. Teachers should help students develop confidence in answering questions in the class. Teachers can use social persuasion and mastery experience approaches to enhance students' academic self-efficacy (Bandura, 1977). Based on the qualitative findings of our study, we suggest teachers afford students the opportunities to experience incremental success in the classroom and provide encouragement, appreciation, and support during classroom interaction (Sanderson & Greenberger, 2010), which can support students' sense of competence. Barriers to non-verbal communication in online learning may make it difficult to provide immediate feedback to each student (Olszewski-Kubilius & Lee, 2004); therefore, we suggest teachers use additional offline measures to communicate with students such as via emails or messengers (Thomson, 2010).

Except for the construct of choice, teachers, compared to the students, rated the classroom quality to be slightly higher. This may reflect teacher bias in evaluating classroom quality. Thus, T-POCQ ratings may be prone to inflation and may need to be controlled for teacher bias. Although parents rated the online classes to be of high quality, their mean scores were consistently lower than that of the students and teachers. This gap is possibly a reflection of a lack of communication and feedback among students, teachers, and parents. Face-to-face interaction between teachers and parents may help in bridging this perceptional gap about classroom quality. Besides, the gap in perceptions

challenges the assumption that parents have adequate or accurate visibility of online sessions because students attend the classes from home.

Further, parents rated classes the lowest for appeal, which contradicts ratings from students and teachers who evaluated classes the highest for appeal. Item-wise inspection revealed parents rated item 20 ("The class provides examples of how the material relates to society and daily living") the lowest among appeal ($M = 3.65$). Although the class likely did not provide ample examples of connections with society and daily living, there may be issues with the validity of this item. Parents may not be the best evaluators of what examples were provided in the class as they may not oversee the online classes all the time. This possibility necessitates further psychometric analysis of P-POCQ.

Findings of classroom observations from program staff indicated high levels of content coverage, student involvement in a variety of experiences, and emphasis on higher-order thinking skills. This triangulates the findings from students, parents, and teachers. In TOF-R, content coverage and emphasis on higher-order thinking skills relate to classroom challenge, and student involvement in a variety of experiences relates to meaningfulness and choice. The qualitative findings of this study extended these observations. Students reported experiencing stimulating learning and complex tasks. Teachers accommodated choice through diverse experiences. And knowledge application and problem-solving opportunities supported meaningfulness.

Findings of classroom observations also revealed comparatively low mean scores for classroom technology, opportunities for self-determination, and emphasis on creativity. Online learning necessitates the effective use of technology. Thus, teachers may need additional training to effectively integrate new technologies in the online environment (Sanderson & Greenberger, 2010). Opportunities for self-determination are critical to catalyzing intrinsic motivation (Ryan & Deci, 2000). Although online programs can uniquely support self-determination, offer choices, and accommodate individual interests (Cavanaugh, 2007; Thomson, 2010), this study suggests otherwise. Teachers in synchronous online programs may be limited by similar challenges of real-time instruction in regular in-person programs. Therefore, online teachers should explore additional asynchronous strategies such as email communication (Thomson, 2010) and flipped classrooms to complement synchronous classrooms.

Another notable aspect of this study is support for relatedness. Students, parents, and teachers reported a high level of respect for every member of the class along with the warmth and friendliness of the teacher. These values constitute classroom culture and can have a direct positive influence on students' sense of relatedness (Ryan & Deci, 2000). However, qualitative results illuminated challenges to developing a sense of relatedness in online learning. Students highlighted the role of interpersonal relationships and face-to-face interactions in effective learning (Moore, 1993).

Finally, this study also provides some evidence that SPOCQ can be used with online programs, providing educators and researchers a means to validly assess and improve classroom quality.

Limitations

This study may be limited by the fact that three authors were program staff members involved in the daily administration and curricular affairs of the program. This may have added familiarity bias in interpretations; however, efforts have been taken to mitigate this bias using multi-method and multi-source triangulation. Next, we suggest caution in generalizing our findings to a gifted classroom within schools as this study was done at an outside-of-school weekend program. Further, SPOCQ has not been previously used with Indian students, and the psychometric properties of T-POCQ, P-POCQ, and Course Feedback Form have not yet been rigorously established. Therefore, we warrant caution in generalizing the results of this study. However, data analyses indicated strong support for internally consistent interpretations from a moderate sample of middle and high school students and a small sample of parents from India concerning their perceptions of classroom quality. This suggests SPOCQ and P-POCQ may be usable with Indian populations. Future research should undertake rigorous validation of SPOCQ, T-POCQ, and P-POCQ for Indian students, teachers, and parents, respectively.

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