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# Classroom discussion practices in online remote secondary school settings during COVID-19

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## ABSTRACT

Academically productive talk (APT) in classrooms has long been associated with significant gains in student learning and development. Yet, due to COVID-19 related restrictions, teachers around the world were forced to adapt their teaching to online, remote settings during the pandemic. In this investigation, we studied APT in junior high school during extended online, remote teaching spells. Specifically, we focused on the extent APT was a part of online teaching practices, what characterized teachers who tended to promote APT more in online, remote teaching, and associations between APT and teacher well-being, as well as student motivation and engagement. Findings from two survey studies (Study 1: 99 teachers, and 83 students; Study 2: 399 teachers) revealed the following patterns: Students and teachers agreed that APT was used to a lesser extent in remote, online classes, and associated with more interactive instructional formats (whole classroom discussion, peer group work, and questioning), but not with frontal teaching and individual task completion. Teachers with a higher sense of teaching self-efficacy, autonomous orientations, and higher empathy tended to promote APT in online, remote teaching more. More APT was associated with greater teachers' work-related (i.e., lower burnout, more commitment to teaching, and lower turnover intentions) and psychological well-being (i.e., less depressive and anxiety symptoms, and higher subjective well-being). Finally, student experiences with APT in online, remote learning was positively associated with learning motivation and engagement. Theoretical and practical implications are discussed.

## 1. Introduction

There is substantive evidence showing that dialogue-rich teaching promotes student scholastic achievement and cognitive development (e.g., Howe & Abedin, 2013; Mercer & Littleton, 2007; Resnick, Asterhan, & Clarke, 2015). This “academically productive talk” (APT hereafter) is characterized by particular features (e.g., Michaels, O'Connor, & Resnick, 2008): Accountability to the learning community (e.g., egalitarian participation, careful and respectful listening, building on each other's ideas), accountability to reasoning (e.g., providing reasons and explanations, drawing logical connections and reasonable conclusions, encouraging multiple perspectives), and accountability to knowledge (e.g., contributions and opinions are anchored in external and reliable knowledge sources).

Yet, the majority of research on APT has been conducted in face-to-face, collocated settings. During the COVID-19 pandemic, teaching and learning was predominantly conducted in online, remote formats. In

addition, little is known about what characterizes teachers who tend to use more APT in their classes. Furthermore, whereas the benefits of APT for student learning have been studied extensively, few have focused on the non-scholastic antecedents and outcomes of APT for teachers or students. The present research was designed to further our knowledge in these three areas.

### 1.1. Academically productive classroom talk during COVID-19

APT begins with students thinking out loud about a complex problem that requires collaboration (Resnick, Asterhan, & Clarke, 2018). The teacher works to elicit a range of ideas, which may be incomplete, while guiding other students take up their classmates' statements. It is a teacher-led but student-owned process of shared reasoning, that ultimately leads to a more fully developed, evidence-backed conclusion, solution, or explanation (Resnick et al., 2018).

The majority of research on APT in K-12 education has been

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conducted in face-to-face, collocated, mainstream school settings (e.g., [Resnick et al., 2015](#)). Existing research on APT in online settings, on the other hand, is typically concerned with textual discussions formats, with specifically designated tools, in one-off, tailored activities, and with a strong emphasis on mainstream higher education settings (e.g., [Asterhan & Bouton, 2017](#)).

During the first year of the COVID-19 pandemic, state-mandated restrictions were enforced around the world, causing classroom activities to migrate *en masse* to the digital sphere, and to remote formats. Online, remote education became the norm for extended periods of time, where teachers and students were often unable to share a physical space for months at a time. Moreover, online, remote education was not limited to selected programs or geographically distanced populations with specially designed materials and trained teachers. This situation provided us with a unique opportunity to examine APT in full online, remote setting in mainstream education.

The transition to online, remote teaching raised uncertainty among teaching staff ([Kim & Asbury, 2020](#)). Teachers mentioned the absence of preparation, training and proper infrastructure as a major challenge of online, remote teaching during the pandemic ([Kundu & Bej, 2021](#)). They were forced to teach from their private homes, while also caring for other family members, and juggling between family and work duties ([Gutentag & Asterhan](#), under review). Therefore, it is not surprising that teachers reported high levels of burnout ([Pressley, 2021](#)). Given the challenges the COVID-19 related restrictions posed for teaching, our first aim was to document the extent in which teachers were able to promote APT in these conditions.

### 1.2. What characterizes teachers who promote academically productive talk?

Previous research has shown that teachers differ in the extent to which they encourage APT in their everyday teaching practices (e.g., [Howe, Hennessy, Mercer, Vrikki, & Wheatley, 2019](#)). Yet, little is known about what characterizes teachers who use APT in their teaching practices, neither in general, nor in online, remote education. Based on theory and on first indications from recent research, we focused on three teacher characteristics: Empathy, self-efficacy and autonomous orientations.

Empathy involves sharing and perceiving the experience of another, and mentalizing the target intentions, beliefs, and emotions ([Zaki, 2014](#)). Teacher empathy is known to be a strong predictor of student achievement ([Cornelius-White, 2007](#)) and is likely to play a prominent role in APT as well: A teacher facilitating classroom discussions is required to understand a wide range of non-expert, and at times even illegible, student responses, that are likely to be introduced into a discussion space. These different perspectives have to be orchestrated into a coherent line of collective reasoning. Sensitivity to social-interactional processes between student participants (e.g., listening, competition for turn taking), as well as to individual and collective sentiments (e.g., boredom, frustration) is pivotal to ensure a positive and meaningful experience for all students. Empathy is likely to play an even more prominent role in online, remote setting, particularly if it involves social interaction, such as discussions. Social cues are scarcer in online, remote interaction formats (e.g., [Caspi & Blau, 2010](#); [Daft & Lengel, 1984](#)), which makes it even more difficult to accurately “read” the situation. Therefore, we hypothesized that more empathetic teachers would employ APT more during online, remote teaching.

Self-efficacy concerns a person’s beliefs in his/her capabilities to produce given attainments ([Bandura, 1997](#)). With respect to teaching, this concerns a teacher’s belief in his/her capabilities to teach effectively. We posit that employing APT goes hand-in-hand with teacher self-efficacy: First, teaching self-efficacy affects the effort teachers put into teaching ([Tschannen-Moran, Hoy, & Hoy, 1998](#)). Conducting classroom discussion around open-ended questions about the topic taught requires substantive teacher effort: Preparation, dedication, and

energy. Second, teachers with a strong sense of teaching self-efficacy are more open to try new instructional methods that better meet their students’ needs ([Tschannen-Moran et al., 1998](#)). Extrapolating from these findings, it is reasonable to assume that, teachers with a strong teaching self-efficacy are also more likely to be willing to ‘take a leap’, and open the floor to student participation to open-ended questions (for which student responses are less predictable compared to close-end questions). Third, teacher-student interaction quality in classrooms is positively associated with teaching self-efficacy ([Perera & John, 2020](#)). Indeed, recent research has shown that classrooms taught by teachers with high (vs. moderate) teaching self-efficacy were characterized by more child-initiated and high-quality dialogue ([Muhonen, Pakarinen, Rasku-Puttonen, & Lerkkanen, 2021](#)). We therefore hypothesized that higher teaching self-efficacy would be associated with more APT in online, remote teaching.

According to self-determination theory (SDT), people seek to satisfy three basic needs: Autonomy, relatedness, and competence ([Ryan & Deci, 2002](#)). When all three needs are satisfied a person is considered to have autonomous orientations ([Ryan & Deci, 2017](#)). [Kaplan and Assor \(2012\)](#) have argued that the main tenets of SDT are highly relevant to APT: Among others, the types of teacher actions that are described as autonomy-supportive are in many ways similar to teacher moves that promote APT, such as encouraging the expression of criticism and independent opinions, and acknowledging different frames of reference ([Assor, Kaplan, & Roth, 2002](#)). In addition, to foster student autonomous orientations, teachers must first perceive themselves as self-determined learners ([Roth, Assor, Kanat-Maymon, & Kaplan, 2007](#)). Therefore, we hypothesized that the higher teacher autonomy motivation, the more they will employ APT in online, remote teaching.

### 1.3. Correlates of online academically productive talk

We explored non-cognitive correlates of APT in online, remote settings, for both teachers and students.

#### 1.3.1. Teacher work-related and psychological well-being

The COVID-19 pandemic and the subsequent social restrictions introduced additional stressors to the already high demanding profession of teaching, including the overnight conversion to full-time online, remote teaching ([MacIntyre, Gregersen, & Mercer, 2020](#)). Stressors, such as the COVID-19 pandemic, lead to burnout, which is characterized by emotional exhaustion, depersonalization, and low levels of personal accomplishment ([Maslach & Jackson, 1981](#)). Burnout is associated with lower job commitment, and with higher turnover intentions ([Chen & Yu, 2014](#)).

We suggest that APT in online, remote teaching would be associated with work-related well-being. On the one hand, high teacher work-related well-being might promote APT in online, remote teaching. As APT is assumed to require a high amount of effort from the teachers ([Muhonen et al., 2021](#)), teachers who are energetically depleted due to COVID-19, will promote APT only to the extent they have available resources, such as high work-related well-being. A reversed causal relation is also a possibility: Conducting APT in online, remote teaching could improve teacher work-related well-being. Recent research has shown that individual well-being during the COVID-19 pandemic was positively associated with an individual’s feeling of being connected to others ([White & Van Der Boor, 2020](#)). APT, even in an online format, involves more interactional contact between teachers and students compared to face-to-face instruction formats. As such, it can be expected to promote teacher work-related well-being. We hypothesized that APT in online, remote teaching would be positively associated with teacher work-related well-being (i.e., lower burnout, higher job commitment, lower turnover intentions).

With respect to teachers’ psychological well-being, we focused on anxiety, depression, and subjective well-being. Anxiety and depression have been found to have increased during the pandemic ([Barzilay et al.,](#)

2020). It has also been assumed to affect teacher well-being (Dabrowski, 2020). Lower well-being is associated with lower teaching quality (Holmes, 2005), whereas APT is considered a high-quality form of teaching (Resnick et al., 2015). Like work-related well-being, psychological well-being can be both the cause and/or the outcome of APT in online, remote teaching. Therefore, we hypothesized that APT in online, remote teaching would also be positively associated with psychological well-being (e.g., lower depression and anxiety, and the higher subjective well-being).

### 1.3.2. Student motivation and engagement

Reports have documented an overall drop in students' academic motivation during the COVID-19 pandemic (Zaccoletti et al., 2020). One of the hallmarks of dialogue-rich instruction is that it encourages active student participation: Students are expected to participate actively and contribute self-generated, genuine contributions to open-ended questions and explore them collaboratively. Recent research in face-to-face settings has shown that more APT is indeed associated with more overall student motivation and engagement (Böheim et al., 2021; Kiemer, Gröschner, Pehmer, & Seidel, 2015; Wu, Anderson, Nguyen-Jahiel, & Miller, 2013). In the present work, we sought to examine if the same applies to online, remote teaching and whether, as such, it might mitigate the adverse effects of COVID-19 on student academic motivation and engagement.

With respect to student motivation, we choose to focus specifically on learning self-efficacy and on achievement goals. Although not yet tested empirically, it has been suggested that APT translates into improved achievements through raising student academic self-efficacy (O'Connor, Michaels, & Chapin, 2015). Findings from in-depth student interviews have also suggested the opposite, namely that perceived academic self-efficacy may be a prerequisite for students to participate in classroom discussions (Clarke, Howley, Resnick, & Rosé, 2016). Either way, we hypothesized that APT would be positively associated with student academic self-efficacy.

Achievement goal theory (Dweck & Elliott, 1983) distinguishes between two broad types of academic motivation goals: *Performance-oriented goals*, where the purpose is to validate one's ability or avoid demonstrating a lack of ability, and *learning-oriented goals*, where the aim is to acquire new knowledge or skills. Learning-oriented goals sustain intrinsic motivation, planning, persistence, mastery-oriented coping methods, better processing of course material, higher grades, and greater improvement over time (Grant & Dweck, 2003). The potential role of achievement goals has recently received some attention in APT research. On the one hand, naturally occurring differences in individual achievement goals predicted differences in dialogic participation (Asterhan, 2018). Alternatively, it is likely that recurrent experiences and practice with APT would shape students' orientations toward learning-oriented goals (Resnick et al., 2018; Turner et al., 2002), as students are encouraged to think through and solve open-ended, challenging topics collectively. Therefore, we hypothesized that APT in online, remote teaching would be positively associated with learning-oriented, but not performance-oriented, goals.

With respect to student engagement, we focus on academic engagement and on study-related burnout. One of the major challenges of online, remote teaching during the COVID-19 pandemic has been student disengagement and silent dropout (Holquist et al., 2020). We posit that online, remote teaching that is infused with more APT is likely to mitigate these negative effects of the pandemic. Compared to face-to-face instruction, students take a more active role in APT. Indeed, reports from face-to-face settings have shown greater student engagement in dialogic classrooms (Vasalampi et al., 2021; Wu et al., 2013). We therefore hypothesized that experiencing online, remote teaching that is richer in APT would be associated with higher academic engagement.

Student burnout is characterized by exhaustion of studying, cynicism toward studying, and lower professional efficacy associated with

studying (Schaufeli, Martinez, Pinto, Salanova, & Bakker, 2002). Online, remote teaching infused with more APT, is more interactive, engaging, and requires the proficiency of students. Therefore, we hypothesized that experiencing online, remote teaching that is richer in APT would be associated with lower study-related burnout.

### 1.4. The present research

The present research was designed to achieve three aims: The first was to document to what extent APT is a part of online, remote education during the COVID-19 pandemic. The second aim was to examine what characterized teachers who tended to promote APT in online, remote teaching. Specifically, we hypothesized that empathy, teaching self-efficacy, and autonomous orientations would be positively associated with the employment of APT. We also tested in an exploratory manner the associations between APT in online, remote teaching and teacher demographics and their students' academic level. The third aim was to examine to what extent APT in online, remote education would predict teacher well-being and student academic motivation and engagement. For teachers, we hypothesized that APT in online, remote teaching would be associated with better work-related and psychological well-being. For students, we hypothesized that APT in online, remote learning would be associated with student motivation and engagement.

To these aims, we conducted two survey studies. The studies were conducted among Israeli, Hebrew speaking middle school students (Study 1) and teachers (Studies 1–2) from similar segments in the population, who spent the majority of time studying and teaching in full online, remote conditions, due to COVID-19 related restrictions. There were three state-mandated lockdowns in Israel. The exit strategy from each lockdown involved several steps, yet mainstream middle schools were always the last to return to face-to-face, collocated teaching and learning. The data for the two survey studies were collected toward the end of the second lockdown (December 2020; Study 1), and toward the end of the third lockdown (February–March 2021; Study 2). During both data collection periods, middle schools were still operating in online, remote format only, and had been doing so for several months straight. Joining recent efforts (e.g., Howe et al., 2019), APT was studied in samples of teachers and students drawn from the general population, not from a pool of participants in intervention or reform programs to promoting APT. Our goal was to examine naturally occurring and existing differences in the extent of APT in online remote teaching settings in the general population.

## 2. Study 1

Study 1 was designed to address all three research aims in an exploratory setup. We collected teacher and student reports from similar segments in the population on different elements of face-to-face, collocated instruction practices prior to the pandemic (retrospective), and of current online, remote instruction practices. Data collection was therefore limited to 8th and 9th graders, as 7th grade middle schoolers would not have a reference point of face-to-face middle school classes prior to the pandemic.<sup>1</sup>

Using a certain teaching format (e.g., whole group discussion) does not guarantee that the teacher uses APT. However, certain teaching formats are more in line with APT and collective knowledge building than others (Alexander, 2000), particularly those that are based on active participation of multiple participants in social, verbal interaction, such as whole groups discussion, smaller collaborative groups, or with pairs of students. Therefore, we expected that using more APT in online, remote teaching would be associated with more whole classroom discussion, work in peer groups, peer dyadic tasks, and questioning, but not with frontal teaching, or individual task completion.

<sup>1</sup> Middle school in Israel starts in 7th grade (age 11).

## 2.1. Method

### 2.1.1. Participants

Participants were two independent samples of teachers and students (not teachers and their students), from multiple schools, representing the Jewish public education sector in Israel. The final sample consisted of 99 teachers ( $M_{age} = 39.67$ ,  $SD_{age} = 10.64$ ; 77.8% females; 58.6% teach in secular Hebrew speaking public education sector, 28.3% in religious Hebrew speaking public education sector, and 11.1% in other education sectors; 86.9% native Hebrew speakers; 50.5% resided in central, 28.3% in northern, and 19.2% in southern Israel). 359 additional teachers did not pass the selection criteria: Being an active middle school teacher, who presently teaches in online, remote format only (excluding special education sector who were exempt from COVID-19 restrictions), and giving their consent to participate in the study. Sixty additional teachers did not complete the survey, and 20 others did not pass the attention checks.

The final sample consisted of 83 middle school students (60.2% 9th graders and 39.8% 8th graders;  $M_{age} = 13.90$ ,  $SD_{age} = 0.62$ ; 62.7% females; 65.1% from the secular Hebrew speaking public educational sector, and 34.9% from the religious Hebrew speaking public educational sector; 86.7% and 86.7% had a native Hebrew speaker mother and father, respectively; 65.1% resided in central, 19.3% in northern, and 14.5% in southern Israel). 196 additional students did not pass the selection criteria: Being a 7th or 8th grade student in a Hebrew speaking public education sector, who presently taught in online, remote format only, and gave parental consent to participate in the study. Thirty-nine additional students did not complete the survey, and 31 others did not pass the attention checks.

Participants were recruited via iPanel (<https://www.ipanel.co.il/en/>), the largest online panel in Israel, and compensated with vouchers. A power analysis using G\*Power 3.0 (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that a sample of 84 is required to detect a medium Pearson correlation effect size ( $r = 0.30$ ), with 80% power, and 0.05 alpha.

### 2.1.2. Materials

**Empathy.** Teachers indicated their empathy frequency ("In general, how frequently do you feel empathy?" 1 – never; 4 – sometimes; 7 – always).

**Teaching formats.** Teachers rated (1 = not at all; 7 = very much) their use of several teaching formats (frontal teaching, whole classroom discussion, peer group work, work in peer dyads, and individual task completion) twice: (1) referring to a typical face-to-face class before the COVID-19 restrictions; and then separately (2) referring to a typical online, remote class during COVID-19 restrictions, at the present moment. Students rated the same set of items (before and during COVID-19 separately), but referring to the extent to which they typically experienced the five type of teaching formats.

**Academically productive talk.** We developed 9 items to capture the extent to which APT is used and promoted (see Supplemental Materials for the wording of the items, and Appendix for the final-revised version used in Study 2). Teachers and students rated (1 = not at all; 7 = very much) the scale twice: (1) referring to a typical face-to-face class before the COVID-19 restrictions; and then (2) referring to a typical online, remote class during COVID-19 restrictions, at the present moment. We conducted 4 exploratory factor analyses on the scale (teachers\students X before\during COVID-19), using principal component analysis with Promax rotation. The analysis extracted one factor, as determined by the

scree plot. After removing three items not sufficiently loaded ( $<|0.40|$ ) on the factor in any of the analyses, items were loaded on the factor, with two exceptions.<sup>2</sup> Explained variance was 49.8% and 46.5% for teachers before and during COVID-19, respectively ( $\alpha = 0.79$  and 0.77, respectively); and 37.8% and 42.3% for students before and during COVID-19, respectively ( $\alpha = 0.66$  and 0.71).

**Questioning.** Teachers were asked to rate (1 = not at all; 7 = very much) the extent to which they encouraged students to ask questions, and used questions to spark a discussion in a typical online class during COVID-19. Students rated the same items referring to the questioning in a typical class during COVID-19.

**Teaching self-efficacy.** Teachers rated (1 = nothing; 9 = a great deal) the 12-item short-version Ohio State teacher efficacy scale (Tschanen-Moran & Hoy, 2001). The scale has three subscales: efficacy for instructional strategies (e.g., "To what extent can you use a variety of assessment strategies?";  $\alpha = 0.83$ ), efficacy for classroom management (e.g., "How much can you do to control disruptive behavior in the classroom?";  $\alpha = 0.87$ ), and efficacy for student engagement (e.g., "How much can you do to get students to believe they can do well in school-work?";  $\alpha = 0.89$ ). We also computed an overall teaching self-efficacy scale score ( $\alpha = 0.92$ ).

**Burnout.** Teachers rated (1 = very mild, barely noticeable; 7 = very strong, major) the 9-item short-version of the burnout scale (Maslach & Jackson, 1981). The scale has three subscales: emotional exhaustion (e.g., "I feel emotionally drained from my work";  $\alpha = 0.82$ ), personal accomplishment (e.g., "I feel I'm positively influencing other peoples' lives through my work";  $\alpha = 0.76$ ), and depersonalization (e.g., "I've become more callous toward people since I took this job";  $\alpha = 0.51$ ). Due to the low internal reliability of the depersonalization scale, we also computed an overall teacher burnout scale score after reverse-scoring the personal accomplishment items ( $\alpha = 0.80$ ).

Students rated (1 = very mild, barely noticeable; 7 = very strong, major) the 15-item Maslach Burnout Inventory Student Survey (Schaufeli et al., 2002). The scale has three subscales: exhaustion (e.g., "I feel emotionally drained by my studies";  $\alpha = 0.91$ ), professional efficacy (e.g., "During class I feel confident that I am effective in getting things done";  $\alpha = 0.77$ ), and cynicism (e.g., "I have become more cynical about the potential usefulness of my studies";  $\alpha = 0.83$ ). We also computed an overall study-related burnout scale score after reverse-scoring the professional efficacy items ( $\alpha = 0.88$ ).

**Student achievement goals.** Students rated (1 = strongly disagree; 7 = strongly agree) the 18-item Achievement Goal Inventory Items (Grant & Dweck, 2003). The scale has six subscales: outcome goal (e.g., "A major goal I have in my courses is to perform really well";  $\alpha = 0.87$ ), ability goal (e.g., "It is important to me to confirm my intelligence through my schoolwork";  $\alpha = 0.85$ ), normative goal (e.g., "I try to do better in my classes than other students";  $\alpha = 0.86$ ), normative ability (e.g., "In school I am focused on demonstrating that I am smarter than other students";  $\alpha = 0.95$ ), learning (e.g., "In my classes I focus on developing my abilities and acquiring new ones";  $\alpha = 0.75$ ), and challenge-mastery (e.g., "It is very important to me to feel that my coursework offers me real challenges";  $\alpha = 0.83$ ).

**Learning self-efficacy.** Students rated (0 = cannot do at all; 100 = highly certain can do) the 9-item Self-Efficacy for Self-Regulated Learning scale (Bandura, 2006; e.g., "Get myself to study when there are other interesting things to do";  $\alpha = 0.91$ ).

**Academic engagement.** Students rated (1 = very mild, barely noticeable; 7 = very strong, major) the 14-item Utrecht Work Engagement Scale for Students (Schaufeli et al., 2002). The overall academic

<sup>2</sup> Item 7 was below the threshold once (0.37) for students before COVID-19, and item 6 was below the threshold once (0.30) for students during COVID-19. Due to the lack of consistency in the loading pattern results, and the fact that in the other 3 cases these items were above the threshold, we decided to include them in the final factor.

engagement scale ( $\alpha = 0.90$ ) comprises three subscales: vigor (e.g., “When studying I feel strong and vigorous”;  $\alpha = 0.81$ ), dedication (e.g., “I am enthusiastic about my studies”;  $\alpha = 0.83$ ), and absorption (e.g., “Time flies when I’m studying”;  $\alpha = 0.79$ ). We also computed an overall academic engagement scale score ( $\alpha = 0.90$ ).

*Overall academic level of students taught.* Teachers were asked to rate if they taught mostly students struggling with studying (1) to excellent students (7).

*Attention checks.* In the beginning, middle and end of the survey, participants were asked to mark a certain number (“In this item, please mark ‘3’”; Oppenheimer, Meyvis, & Davidenko, 2009). A successful completion of the attention check means marking the right number.

### 2.1.3. Procedure

Studies 1 and 2 received approval from institutional ethics committees.<sup>3</sup> Teachers and students received similar questionnaires, yet adapted to age group, setting, and research questions. Teachers first read the general information and consented to participate in the study anonymously. They then rated their empathy. Next, they rated their use of teaching formats, the extent to which they use and promote APT in their class, before COVID-19. Then, they rated the same items set in the present (that is, during the online, remote teaching situation due to the COVID-19 pandemic). Next, they rated their use of questioning in class during COVID-19, teaching self-efficacy, and burnout. Finally, they completed a demographic questionnaire (i.e., age, sex, family status, having children, religion, religiosity, perceived socioeconomic status, years of teaching experience), and rated the overall academic level of their students.

Students first read the general information and consented to participate in the study anonymously. Then, they rated the teaching formats used in their class, and the extent to which APT was used and promoted in their class, before COVID-19. Then, they rated the same items set in the present. Next, they rated questioning in their class during COVID-19, their achievement goals, learning self-efficacy, academic engagement, and study-related burnout. Finally, they completed a demographic questionnaire.

## 2.2. Results

### 2.2.1. To what extent was APT part of online teaching practices during COVID-19?

We compared the reports of teachers and of students regarding the extent of teaching formats that were used, before and during COVID-19. As can be seen in Table 1, teachers reported using all teaching formats less during (vs. before) the pandemic. Students mostly agreed with these perceptions, with two exceptions: They reported more frontal teaching during online, remote learning, and no change in the extent of individual task completion. Although teachers and students alike reported that the extent of APT decreased during the pandemic, it was still used rather extensively in online, remote classes.

Next, we examined the association between APT, and teaching formats and questioning during the pandemic, separately for students and teachers. Table 2 shows that, for teachers and students alike, APT in online, remote classes was positively associated with whole classroom discussion, work in peer groups, use of questions to spark discussion, and encouraging students to ask questions. Only for students, APT in online, remote learning was also associated with more work in peer dyads. APT in online, remote classes was not associated with frontal teaching and individual task completion, as reported by both teachers and students.

### 2.2.2. What characterizes teachers who tended to promote APT in online, remote teaching?

As can be seen in Table 3 and as predicted, APT in online, remote teaching was positively associated with empathy, and teaching self-efficacy (overall, and the subscales: instructional strategies, classroom management, and student engagement). We also examined in an exploratory manner the associations between APT in online, remote teaching and teacher demographics and their students’ academic level. There were no associations between APT in online, remote teaching and teacher’s age, sex, family status, having children, religion, religiosity, perceived socioeconomic status, and years of teaching experience. In addition, there was no association between APT and the overall academic level of the student taught.

### 2.2.3. Associations between APT in online, remote teaching and learning, and teacher well-being and student motivation and engagement

As can be seen in Table 4 and as expected, teacher reports on using APT in online, remote teaching was positively associated with lower burnout (overall, and the subscales: personal accomplishment, depersonalization, but not emotional exhaustion). With respect to students, APT in online, remote learning was positively associated with higher learning self-efficacy, and with higher learning-oriented goals (learning and challenge-mastery goals), but not with performance-oriented goals (outcome goal, ability goal, normative goal, normative ability). It was also associated with academic engagement (overall, and the subscales: vigor, dedication, and absorption), and lower study-related burnout (overall, and the subscale cynicism, but not exhaustion, and professional efficacy).

## 2.3. Discussion

Both teachers and students reported that, compared to face-to-face teaching before the pandemic, online, remote teaching during COVID-19 was characterized by less classroom activities that included social interaction: Less whole classroom discussions and less peer collaboration activities (group work and peer dyads). While teachers reported to use frontal teaching methods less during the pandemic, students reported experiencing frontal teaching more. In addition, while teachers reported lesser extent of individual student work during the pandemic, students reported no change compared to before the pandemic. There are several possible explanations to the discrepancy between teacher and student reports. First, it is possible that teachers and students used different reference points to report on their experiences with teaching formats: From a more global perspective (e.g., teachers factually spent less time teaching overall, in any format), or a more relative one (e.g., although they were taught less overall, a relatively larger chunk of that time was devoted to frontal teaching). Another explanation could be found in the nature of the medium. For example, teachers try to teach in a more interactive manner, yet this comes across as frontal from the users’ end. Future research could examine these possibilities.

Both teachers and students reported lower indices of APT in online, remote instruction. For both students and teachers, greater use of classroom APT went hand-in-hand with more interactive teaching formats (whole classroom discussion, peer group work, and questioning), but not with frontal teaching and individual task completion. In the student sample, it was also associated with work in peer dyads.

Teachers who were more empathetic and had a higher sense of teaching self-efficacy, reported to infuse APT in their online, remote teaching. The greater the extent of use of APT during the pandemic, the less burned out they were. Students who experienced more APT in their online learning reported higher learning self-efficacy, more learning-oriented motivation, higher academic engagement, and lower study-related burnout.

<sup>3</sup> Data in all studies were collected as part of a larger project designed to answer multiple research questions, and we only report variables relevant to these studies.

**Table 1**  
Teaching formats before and during COVID-19 online, remote teaching and learning (study 1).

Teaching formats	COVID-19	Teachers				Students			
		M	SD	t	p	M	SD	t	p
Frontal teaching	Before	5.97	1.20	7.08	<.001	5.40	1.38	-4.18	<.001
	During	4.55	1.79			6.13	1.11		
Whole classroom discussion	Before	5.38	1.54	5.98	<.001	5.17	1.51	8.75	<.001
	During	4.14	1.77			3.31	1.53		
Work in peer groups	Before	4.57	1.80	4.65	<.001	4.55	1.47	4.87	<.001
	During	3.42	2.08			3.41	1.65		
Work in peer dyads	Before	4.78	1.59	7.84	<.001	4.75	1.64	7.02	<.001
	During	3.00	1.94			3.01	1.76		
Individual task completion	Before	5.10	1.61	2.34	.021	4.24	2.02	-1.24	.219
	During	4.62	1.98			4.52	2.25		
Academically productive talk	Before	5.33	0.76	6.10	<.001	4.81	0.75	5.98	<.001
	During	4.85	0.92			4.28	0.90		

**Table 2**  
Associations between teaching formats, questioning, and APT in online, remote teaching and learning (study 1).

Variable	Report on APT in online, remote setting of	
	Teachers	Students
Frontal teaching	-.05	-.13
Whole classroom discussion	.32**	.42**
Work in peer groups	.21*	.22*
Work in peer dyads	.06	.34**
Individual task completion	-.02	.08
Use of questions to spark discussion	.42**	.54**
Encouraging students to ask questions	.54**	.44**

Note. \*p < .05; \*\*p < .001.

**Table 3**  
The Associations between teacher characteristics and APT in online, remote teaching (study 1 and 2).

Variable	APT in online, remote setting	
	Study 1	Study 2
Empathy	.21*	.21**
Teaching self-efficacy - instructional strategies	.45**	.46**
Teaching self-efficacy - classroom management	.43**	.39**
Teaching self-efficacy - student engagement	.47**	.36**
Teaching self-efficacy - total score	.51**	.47**
Autonomy	-	.23**
Competence	-	.31**
Relatedness	-	.25**
Autonomous orientations	-	.32**

Note. \*p < .05; \*\*p < .001. There is no change in significance pattern after applying the FDR correction for multiple comparisons.

**3. Study 2**

Study 2 built on Study 1 and extended it in several ways. First, we added a third teacher-related predictor of APT, namely autonomous orientations, in addition to empathy and teaching self-efficacy. We examined the relative contribution of each of these three predictors with multiple regression models. Second, in Study 1 we only focused on one aspect of teacher well-being (namely, burnout). Study 2 therefore focuses on teachers, examining the associations between APT and a wider range of work-related and psychological aspects of well-being. As for teacher work-related well-being, we also measured job commitment and turnover intentions, in addition to burnout. As for teacher psychological well-being, we added measures of depressive symptoms, anxiety symptoms, and subjective well-being.

Third, we revised the scale developed and used in Study 1 to test APT. Three reverse items did not load on the APT factor in Study 1; it is possible some participants did not notice that these items were reversed,

**Table 4**  
The Associations between APT in online, remote teaching and learning, and teacher work-related and psychological well-being and student motivation and engagement (study 1 and 2).

Category	Variable	APT in online, remote setting		
		Study 1	Study 2	
Teacher work-related well-being	Burnout - emotional exhaustion	-.15	-.15**	
	Burnout - personal accomplishments	.30**	.40**	
	Burnout - depersonalization	-.43**	-.20**	
	Burnout - total score	-.35**	-.30**	
	Job commitment	-	.33**	
Teacher psychological well-being	Turnover intentions	-	-.18**	
	Depressive symptoms	-	-.20**	
	Anxiety symptoms	-	-.17**	
Student motivation	Subjective well-being	-	.20**	
	Learning self-efficacy	.43**	-	
	Achievement goals - outcome goal	.14	-	
	Achievement goals - ability goal	.19	-	
	Achievement goals - normative goal	.01	-	
	Achievement goals - normative ability	-.03	-	
	Achievement goals - learning	.30**	-	
	Achievement goals - challenge-mastery	.23*	-	
	Student engagement	Academic engagement - vigor	.39**	-
		Academic engagement - dedication	.25*	-
Academic engagement - absorption		.31**	-	
Academic engagement - total score		.37**	-	
Study-related burnout - exhaustion		-.15	-	
Study-related burnout - professional efficacy		.18	-	
Study-related burnout - cynicism	Study-related burnout - cynicism	-.31**	-	
	Study-related burnout - total score	-.27*	-	

Note. \*p < .05; \*\*p < .001. There is no change in significance pattern after applying the FDR correction for multiple comparisons.

resulting in low loadings. In Study 2, we converted the reversed items back to regular, unreversed, items. In addition, in consultation with a forum of APT experts, three new items were written to better capture the richness of the APT concept. Another item was rewritten to clarify its meaning.

### 3.1. Method

#### 3.1.1. Participants

The final sample consisted of 399 teachers ( $M_{age} = 38.01$ ,  $SD_{age} = 10.41$ ; 76.2% females; 90.79% native Hebrew speakers; social-economic ranking of the Israeli Central Bureau of Statistics [2021] 6.18,  $SD = 1.87$  [on a 1–10 scale]). 420 additional teachers did not pass the selection criteria: Being an active subject or homeroom teacher, in middle school, in the Hebrew speaking public education sector, who presently teaches in online, remote format only, and giving their consent to participate. 266 additional teachers did not complete the survey. Participants were recruited via an initiated contact with every public secular and religious school in the Hebrew speaking sector of the Israeli education system, and via Facebook and Whatsapp, until quota (2/3 secular and 1/3 religious public schools, to represent their relative frequency in the population) was met. Participants were compensated with vouchers equivalent to 50 NIS. A power analysis using G\*Power 3.0 (Faul et al., 2007) indicated that a sample of 368 was required to detect a small effect size in a multiple regression with three predictors ( $f^2 = 0.03$ ), with 80% power, and 0.05 alpha. We increased this sample size by approximately 10% to account for possible attrition.

#### 3.1.2. Materials

**Empathy.** As in Study 1, teachers indicated (1 = not at all; 7 = very much) how much empathy they experienced in general. In addition, they also indicated how empathetic they feel in general. We averaged both items ( $\alpha = 0.84$ ).

**Academically productive talk.** The Academically Productive Talk scale was a revision of the scale used in Study 1 (see Appendix for the full scale). Teachers rated (1 = not at all; 7 = very much) the scale that referred to the present only, while all school activities and teaching was online and remote due to COVID-19 restrictions. We conducted an exploratory<sup>4</sup> factor analysis on the revised 12-items scale, using principal component analysis with Promax rotation. The analysis extracted one factor, as determined by the scree plot. All items were loaded on the factor ( $<[0.40]$ ), and explained variance was 35.8% ( $\alpha = 0.83$ ).

**Teaching self-efficacy.** Teachers rated the 12-item short-version Ohio State teacher efficacy scale (Tschannen-Moran & Hoy, 2001) used in Study 1 (instructional strategies, classroom management, student engagement, and overall teaching self-efficacy scale score,  $\alpha = 0.76$ , 0.77, 0.75, and 0.87, respectively).

**Burnout.** Teachers rated the burnout scale (Maslach & Jackson, 1981) used in Study 1 (emotional exhaustion, personal accomplishment, depersonalization, and teacher burnout scale score,  $\alpha = 0.79$ , 0.65, 0.63, and 0.80, respectively).

**Job commitment.** Teachers rated (1 = not at all; 5 = extremely) the 4-item Klein, Cooper, Molloy, and Swanson (2014), Unidimensional, Target-free (KUT) measure (e.g., “How committed are you to the teaching vocation?”;  $\alpha = 0.91$ ).

**Turnover intentions.** Teachers rated (1 = never; 6 = extremely often much) how often they had seriously considered quitting their present teaching profession (Spector, 1985).

**Autonomous orientations.** Teachers rated their agreement (1 = strongly disagree; 7 = strongly agree) with the 9-item Need Satisfaction Scale (La Guardia, Ryan, Couchman, & Deci, 2000). The scale has three subscales: autonomy (e.g., “I feel free to be who I am”;  $\alpha = 0.70$ ), competence (e.g., “I feel like a competent person”;  $\alpha = 0.61$ ), and relatedness (e.g., “I feel loved and cared about”;  $\alpha = 0.56$ ). Due to the low internal reliability of the competence and relatedness scales, we also computed an overall autonomous orientations score after reverse-scoring three items ( $\alpha = 0.79$ ).

**Depressive symptoms.** Teachers rated the frequency (1 = rarely or

none of the time; 4 = most or all of the time) of 2 representative symptoms (“I felt depressed” and “I could not get ‘going’”) from the short Center for Epidemiologic Studies Depression scale (CES-D; Radloff, 1977), referring to the past month ( $\alpha = 0.77$ ).

**Anxiety symptoms.** Teachers rated the frequency (0 = not at all; 3 = nearly every day) of 2 representative symptoms (“Feeling nervous, anxious, or on edge” and “Not being able to stop or control worrying”) from the 7-item brief generalized anxiety disorder scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006), referring to the past month ( $\alpha = 0.86$ ).

**Subjective well-being.** Teachers rated (1 = strongly disagree; 7 = strongly agree) the 5-item Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985; e.g., “I am satisfied with my life”;  $\alpha = 0.87$ ).

**Overall academic level of students taught.** Assessed as in Study 1.

#### 3.1.3. Procedure

Teachers read the general information and consented to participate in the study anonymously. Then, they rated their empathy. Next, they rated the extent to which they use and promote APT in their online, remote teaching at the moment (that is, during COVID-19). Then, they rated their teaching self-efficacy, burnout, job commitment, and turnover intentions, followed by rating their autonomous orientations, depressive and anxiety symptoms, and subjective well-being. Finally, they completed a demographic questionnaire, and rated the overall academic level of their students.

### 3.2. Results

The mean use of APT in online, remote teaching reported by teachers ( $M = 4.68$ ,  $SD = 0.83$ ) was similar to that in Study 1 ( $M = 4.85$ ,  $SD = 0.92$ ). The results reported in this section were also tested with Study 1 subset of items, but were found nearly identical to the results reported here (see Supplemental Materials for a comparison table).

#### 3.2.1. What characterizes teachers who tended to promote APT in online, remote teaching?

As can be seen in Table 3 (right column), as expected and similar to Study 1 also presented there (left column), greater use of APT in online, remote teaching was associated with greater empathy of the teacher, and greater teaching self-efficacy (overall, and the subscales: instructional strategies, classroom management, and student engagement). It was also positively associated with teacher autonomous orientations (overall, and the subscales: autonomy, competence, and relatedness).

A multiple regression was carried out to investigate whether empathy, teaching self-efficacy, and autonomous orientations would predict APT in online, remote teaching.<sup>5</sup> The results of the regression indicated that the model was a significant predictor of APT ( $R^2$  change = 0.28,  $F[3395] = 50.55$ ,  $p < .001$ ), and explained 27% of its variance. Each of the predictors contributed significantly to the model, the strongest being teaching self-efficacy ( $B = 0.29$  [ $SD = 0.03$ ],  $\beta = 0.40$ ,  $t = 9.08$ ,  $p < .001$ ), followed by autonomous orientations ( $B = 0.18$  [ $SD = 0.04$ ],  $\beta = 0.20$ ,  $t = 4.35$ ,  $p < .001$ ), and empathy ( $B = 0.10$  [ $SD = 0.04$ ],  $\beta = 0.12$ ,  $t = 2.66$ ,  $p = .008$ ).

As in Study 1, we examined the associations between APT in online, remote teaching and teacher demographics and their students' academic level in an exploratory manner. Similar to Study 1, there were no associations between APT and the following teacher demographics: Age, family status, having children, religion, religiosity, and years of teaching experience. In addition, there was no association between APT and the

<sup>5</sup> A formal test of multicollinearity indicates that Tolerance = 0.95 and VIF = 1.05 for empathy, Tolerance = 0.90 and VIF = 1.11 for autonomy motivation, and Tolerance = 0.93 and VIF = 1.08 for teaching efficacy. According to Ho (2006), tolerance below 0.10 \ VIF greater than 10 merit further investigation, which is not the case here.

<sup>4</sup> Due to the revision, we conducted an exploratory, rather than a confirmatory, factor analysis.



overall academic level of the student taught. However, contrary to Study 1, we did find an association between teacher sex and APT ( $t[397] = 2.00, p = .046, d = 0.24$ ), such that female teachers ( $M = 4.73, SD = 0.85, n_1 = 304$ ) reported using APT more in their online, remote teaching, compared to male teachers ( $M = 4.53, SD = 0.79, n_2 = 95$ ). In addition, APT was weakly and positively associated with perceived ( $r = 0.11, p = .026$ ) and actual ( $r = 0.13, p = .009$ ) socioeconomic status, such that more APT was reported in online classes of teachers with higher socioeconomic status.

### 3.2.2. Associations between APT in online, remote teaching, and teacher well-being

The findings reported in Table 4 (right column) show that as expected and similar to the findings from Study 1 also presented there (left column), greater use of APT in online, remote teaching was associated with lower teacher work-related well-being. Specifically, it was also associated with lower burnout, greater job commitment, and lower turnover intentions. With respect to teacher psychological well-being, greater use of APT in online, remote teaching was associated with lower ratings on depression as well as general anxiety, and with higher subjective well-being.

### 3.3. Discussion

Teachers with a higher sense of teaching self-efficacy, autonomous orientations, and who are more empathetic tend to integrate APT more in their online, remote teaching during COVID-19. Interestingly, female teachers reported using APT in online, remote teaching more than male teachers, and so did teachers with higher socioeconomic status. We could not locate previous studies examining the association between teacher sex, socioeconomic status and APT. Since the effect sizes of these associations were small, did not emerge in Study 1 (perhaps due to the smaller sample used there), and due to their exploratory nature not backed up by previous research, these findings should be interpreted with caution. More research is needed in order to examine if teacher sex and socioeconomic status play a meaningful, consistent role in explaining teacher use of APT in teaching.

Teachers who used more APT in online, remote teaching had higher well-being: With respect to work-related well-being, they were less burned out, more committed to teaching, and reported lower turnover intentions. With respect to psychological well-being, they were less depressed and anxious, and reported higher subjective well-being.

## 4. General discussion

In this investigation, we examined APT in middle school online, remote learning and teaching during the COVID-19 pandemic. First, we examined to what extent APT was part of online, remote teaching practices. Study 1 found that students and teachers agreed that APT was used to a lesser extent during online, remote teaching; and was associated with more whole classroom discussion, work in peer groups, and questioning (but not with frontal teaching and individual task completion). Second, we examined what characterized teachers who promoted APT in online, remote teaching. We found that teachers using more APT tended to be more empathetic, have a higher sense of teaching self-efficacy (Studies 1–2), and autonomous orientations (Study 2). Moreover, a regression analyses showed that the strongest predictor of APT in online, remote teaching was teaching self-efficacy, followed by autonomous orientations, and then empathy (Study 2). Third, we examined to what extent APT in online, remote teaching was associated with teacher well-being, and with student motivation and engagement. Among teachers, more APT in online, remote teaching was associated with greater work-related well-being: Lower burnout (Studies 1–2), higher commitment to teaching, and lower turnover intentions (Study 2). More APT in online, remote teaching was also associated with greater teacher psychological well-being: Less depressive and anxiety symptoms, and

higher subjective well-being (Study 2). Among students, experiencing more APT in online, remote learning was associated with greater learning motivation (i.e., higher learning self-efficacy, greater learning-oriented goals), and learning engagement (i.e., higher academic engagement, lower study-related burnout) (Study 1).

### 4.1. Theoretical implications

The present research contributes to the existing literature in several ways. Although not exclusively, much of existing APT research has been conducted on teachers and students participating in intervention-based programs that aimed to actively promote APT. In the present work, we joined recent efforts (e.g., Howe et al., 2019) to study differences in APT that occur naturally, in a large and demographically heterogeneous samples of both teachers and students. Extending ecological validity, this investigation then complements previous work on APT conducted in more controlled settings (e.g., lab studies, field interventions). In addition, since teacher and student respondents were not part of an APT targeted intervention program, social desirability was likely to have played a significantly lesser role in the current work.

Another unique feature of the present investigation is its focus on the role of APT in full-time, online, remote, oral, and synchronous teaching. Our findings showed that teaching practices were affected by the COVID-19-related restrictions posed on formal education (e.g., less APT compared to face-to-face classes prior to the pandemic). Nevertheless, the findings were in accordance with theory and findings from face-to-face APT. For example, APT in online, remote teaching was associated with higher teaching self-efficacy (similar to Muhonen et al., [2021] on face-to-face APT), and students experiencing more APT in online, remote learning were more academically engaged (similar to Wu et al., [2013] on face-to-face APT).

The role of teacher characteristics in APT has thus far received little attention. We examined three key teacher characteristics, that replicated across two studies: First, teaching self-efficacy predicted APT in online, remote teaching. Interestingly, years of teaching experience (a proxy of teaching proficiency; Kini & Podolsky, 2016) was not associated with APT in online, remote teaching, whereas self-efficacy was. It seems that the perceived, rather than actual proficiency of the teacher is important for the employment of APT. The association of self-efficacy and APT concurs with a recent study in face-to-face setting (Muhonen et al., 2021). Second, autonomous orientations also predicted APT in online, remote teaching. Teaching self-efficacy and autonomous orientations are similar in that they are both subjective, and capture aspects of perceived mastery. The difference between the two is, that whereas teaching self-efficacy refers to the perceived professional capabilities of the teacher, autonomous orientations refers to the autonomy, relatedness, and competence of the teacher as a person in broader terms. This conceptual distinction was further supported by a weak association between the two ( $r = 0.26, p < .001$ ). The association between autonomous orientations and APT is in line with previous study highlighting the relevance of SDT to APT (Kaplan & Assor, 2012). Third, in addition to these two motivational characteristics, empathy also predicted APT in online, remote teaching: The more capable teachers were of sharing and understanding the intentions, beliefs and emotions of their students, the more they employed APT. In total, almost a third of the inter-individual differences in APT in online, remote teaching was explained by these three predictors: The perceived mastery of the teacher, with respect to the teaching profession and in general, and the ability to understand and share the experiences of their students.

This research also joins recent efforts to study the non-cognitive antecedents and outcomes of APT, on the teacher's, as well as the student's end. This investigation was the first to address teacher work-related and psychological well-being with respect to APT. Teacher well-being matters in general, but it is especially relevant in times of crises, such as the COVID-19 pandemic (MacIntyre et al., 2020). APT in online, remote teaching was found to be associated with teacher

work-related and psychological well-being. The directionality of these associations remains unclear, however. It is possible that APT, being an effortful form of teaching, requires that teachers have enough resources at their disposal. In that sense, high well-being is a requirement for APT. On the other hand, APT may also contribute to a teacher sense of connectedness due to more interpersonal and meaningful interactions with students, promoting teacher well-being. Future research could examine the directionality of the association between teacher well-being and APT, as well as its applicability to face-to-face settings.

Findings have shown that, during COVID-19, student motivation (Zaccoletti et al., 2020) and engagement (Holquist et al., 2020) had been compromised. In the present study, we found that more APT was associated with higher student motivation and engagement. Even though a causal direction cannot be inferred, these findings do suggest that APT may serve as a buffer against the negative academically relevant social-emotional effects of COVID-19. These findings are also in line with recent work, showing positive associations between general measures of student motivation, engagement and APT in face-to-face settings (e.g., Böheim et al., 2021). In the present study, we found that more APT was associated with higher student self-efficacy, more performance-oriented goals, more academic engagement, and less study-related burnout. This was the first empirical study that confirmed the hypothesized association between APT and student self-efficacy (O'Connor et al., 2015, pp. 111–126). In addition, and to the best of our knowledge, this was the first time the role of study-related burnout was examined in the context of APT. Future research could further explore the role of these and other non-cognitive constructs in APT-based teaching and learning, both in online and face-to-face settings. Additional constructs that may be of particular interest are, among others, social perspective-taking, sense of belonging and perceived social presence.

#### 4.2. Applied implications

APT in online, remote teaching was associated with teacher well-being and student motivation and engagement. Given that teacher well-being (MacIntyre et al., 2020), student motivation (Zaccoletti et al., 2020) and engagement (Holquist et al., 2020) were negatively affected by COVID-19, it is important to find ways to sustain them. Encouraging teachers to use more dialogue-intensive pedagogies may be one pathway to achieve that. Efforts to promote classroom APT have traditionally focused on teacher professional development programs explaining about and training teachers in classroom dialogue. The present findings show an additional pathway: Teachers' teaching-related self-efficacy, autonomous orientations, and empathy predicted APT in online, remote teaching. Further research is needed regarding the directionality of teacher characteristics and the employment of APT and the relevance of this association beyond self-report measures, and beyond the particular settings we studied here. But to the extent that such characteristics indeed raise teacher inclinations to use APT, nurturing these teacher characteristics them may result in more APT.

This investigation introduced a new tool to assess self-reported APT. Research in this field often relies on meticulous classroom dialogue analyses, which are very resource intensive. Moreover, the video and/or audio-based data collection methods that are required for such analyses are often met with considerable ethics-related hurdles. The tool we have developed in the present investigation could replace, or be used in combination with, classroom dialogue analyses. Its construct validity was demonstrated here: First, it was built according to the conceptual model of APT. Second, as expected, APT in online, remote teaching was correlated with more interactive teaching formats (e.g., whole classroom discussion, work in peer groups), but not with other forms of teaching which are less interactive (i.e., frontal teaching, individual task completion; Resnick et al., 2018). Third, it showed the expected associations with other teacher and student variables, supporting its construct validity. Fourth, it achieved good internal reliability. The

potential usefulness of such a self-report tool, combined with the preliminary evidence on satisfactory validity and reliability, suggest it could provide insightful information on APT. However, more research is needed to further validate it. For example, future research could test the concurrent validity of this self-report APT questionnaire and other, more objective, measures of APT, such as systematic classroom observations.

#### 4.3. Limitations and future research

Our studies were designed to assess APT in online, remote teaching, but such research designs have several limitations. First, although we conjecture that the associations found in the present investigation are also applicable to APT in face-to-face classroom settings, future research should test this directly. Second, the present investigation employed correlational designs, which do not allow for causal inferences. For example, within the current set-up, we cannot discern whether teachers who suffer from less burnout also choose to use APT more, or whether teachers who infuse their teaching with more APT suffer less from professional burnout as a result. Future research could examine the directionality of these effects using experimental designs.

Third, the present investigation was based on teachers and students self-report, which are more prone to social desirability. Nevertheless, we believe teachers and students felt comfortable reporting things as they are, for several reasons. The first is that teacher and student respondents were not part of an APT targeted intervention program, in which due to sunk cost or loyalty considerations, respondents feel compelled to report a more favorable image of reality. The second reason is that this investigation was conducted during the pandemic, which is an external factor that can account for the reported patterns, unrelated to teachers and students personally (e.g., reduced self-efficacy due to the pandemic). The third reason is that participation was anonymous, allowing respondents to report on their feelings and experiences without fear of retribution. Indeed, the high variability in the responses of teachers and students, and their reporting about negative states (e.g., depression) asserts that the self-reports were relatively genuine. Future research should nevertheless compare this investigation's findings against more objective measures (e.g., observations).

Fourth, the scale used in the present investigation was revised from Study 1 to Study 2. The pattern of results before and after the revision, and compared to Study 1, was not significantly different (see Supplemental Materials for a comparison table), and in line with our *a priori* predictions. We nevertheless acknowledge this as a limitation of the present investigation. The revised, and not original, scale should be used in future studies (see Appendix for the revised scale).

Fifth, as expected, we found that teachers using more APT tended to be more empathetic. However, this Pearson correlation was weak in magnitude. It is possible that, should we have probed teachers about their empathy toward students specifically (instead of their general tendency to be empathetic across contexts), stronger associations would have been found. Future research should test this directly.

Sixth, in this investigation we conducted cross-sectional surveys. This form of inquiry does not allow us to examine the underlying process leading to the observed associations. For instance, it would be interesting to study how recurring experiences with APT-infused teaching shapes student engagement. Finally, even though the data in Study 1 was obtained from a sample of teachers and a sample of students taken from similar populations, we could not triangulate teacher reports with those of their own students. In future research, it would be interesting to examine the extent to which teacher and student reports align.

## 5. Conclusions

Infusing online, remote teaching with classroom discussions and collective reasoning on open-ended questions may be perceived as an oxymoron to many. Nevertheless, the findings presented here show that APT was still practiced during COVID-19 online, remote teaching, by

some teachers more than others, and that it predicted better teacher well-being, as well as higher student motivation and academic engagement. Based on these findings, we recommend promoting more awareness and use of APT, not only in face-to-face classrooms settings, but in online, remote teaching as well.

### Credit author statement

**Tony Gutentag:** Funding acquisition; Conceptualization; Methodology; Resources; Roles/Writing - original draft; Writing – review & editing; Formal analysis; Project administration; Investigation. **Aviv Oren:** Project administration; Investigation. **Christa Asterhan:** Funding acquisition; Conceptualization; Methodology; Resources; Roles/Writing - original draft; Writing – review & editing; Supervision.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chb.2022.107250>.

### Appendix. Academically Productive Talk (APT) scale

Teacher survey, revised version used in Study 2 (translated from Hebrew):

In a typical class that I teach in online, remote format during the COVID-19 pandemic:

- 1 not at all
- 7 very much
- There are clear and explicit rules about how to participate in a classroom discussion.
- Participation in classroom discussion is respectful and attentive.
- Most students are active participants in classroom discussions.
- Students express their ideas freely, without worrying about embarrassment caused by “errors”.
- Students feel free to speak their mind, even if it contradicts the opinions of other student or mine.
- Students are expected to justify their answers, and explain how they arrived at them.
- Students are asked to back their answers with external resources (evidence, data, sources etc.).
- Students continue and elaborate on their own and each other’s ideas during discussions.
- I encourage students to consider a range of solutions and perspectives.
- We try to tie together the different ideas proposed during the discussion and summarize.
- During classroom discussions, students try to be precise about facts and conclusions.
- During classroom discussions, we try to get to the bottom of things.

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