

Promoting Need-Supportive Teaching: Evaluating the Impact of a Self-Determination Theory-Based Professional Development Program in Underserved Schools

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Abstract

This study examined the effects of a professional development (PD) program grounded in self-determination theory (SDT) on teachers' instructional practices in underserved school communities. The PD program was designed to equip teachers with strategies to enhance student motivation by supporting their needs for autonomy, competence, and relatedness. A mixed-methods approach with repeated measures (pre- and post-intervention) was used, including focus group interviews, teacher learning assessments, behavioral intention measures, and classroom observations. Findings revealed significant improvements in teachers' use of need-supportive strategies, particularly in taking students' perspectives, offering choices, and promoting collaboration. Although teachers demonstrated strong knowledge acquisition, they needed additional support to fully integrate other strategies, such as providing explanatory rationales. The study underscores the importance of practical, hands-on learning experiences in PD programs and highlights the need for ongoing coaching and school-wide support to ensure the successful implementation of SDT-based strategies. The study contributes to the growing body of research on SDT-based interventions and highlights PD programs' potential to foster more engaging and motivating learning environments for students in underserved schools.

Academic motivation is a critical determinant of students' academic performance and well-being. Rooted in self-determination theory (SDT), there is a foundational belief that all students possess an inherent drive to succeed (Deci & Ryan, 2016; Ryan et al., 2019). However, empirical studies indicate a marked decline in academic motivation during the transition from elementary to middle school, attributed to the challenges of adapting to new educational environments (Gottfried et al., 2007; Miyamoto et al., 2020; Vedder-Weiss & Fortus, 2011). This decline is notably more pronounced among students from low-income communities, where socioeconomic challenges compound the effects of environmental transition (National Research Council Institute of Medicine, 2004; Williams et al., 2018).

While inner drives play a pivotal role in learning, the influence of external support, particularly from teachers, is indispensable. Previous research underscores that teacher support, tailored to fulfill students' basic psychological needs, significantly bolsters academic motivation (D. Johnson, 2017; Reeve & Cheon, 2024; Schuitema et al., 2016). Accordingly, we developed an SDT-based professional development (PD) program for teachers in underprivileged schools. This program

aims to equip teachers with basic psychological need-satisfying strategies to nurture and sustain students' academic motivation, thereby mitigating the decline observed during crucial educational transitions.

Three Basic Psychological Needs

All students enter the classroom with different backgrounds, knowledge levels, personal goals, and self-endorsed values, but they share one thing in common: They all have basic psychological needs for autonomy, competence, and relatedness (Conesa et al., 2022; Wang et al., 2019). *Autonomy*, the most extensively researched psychological need, encompasses a student's sense of ownership and self-direction in their learning journey. Supporting autonomy involves offering students meaningful choices and employing language that encourages self-initiation rather than exerting control. *Competence*, another psychological need, refers to a student's belief in their ability to succeed in learning tasks. This need is bolstered by strategies that teachers and parents can effectively implement, such as positive feedback, optimally challenging tasks, and well-organized learning resources. The third psychological need, *relatedness*, signifies a student's desire for connection and belonging

within the learning community. Fostering an inclusive environment that acknowledges and values each student is crucial for enhancing their learning experience and motivating them to excel. Addressing these basic psychological needs in the classroom not only supports students' academic motivation but also empowers them to engage deeply with their learning processes (Wang et al., 2024).

SDT-Based PD Programs

Numerous studies have introduced SDT-aligned PD programs for teachers, focusing on satisfying students' needs for autonomy, competence, and relatedness. These programs commonly incorporate several key elements. First, they offer informational sessions covering SDT principles, the three basic psychological needs, and various strategies to support these needs in students (e.g., Chiu et al., 2021; Collins, 2000). Second, they encourage teachers to share personal experiences in group discussions, fostering a collaborative learning environment (e.g., Niemiec & Muñoz, 2019). Third, role-playing exercises are used to enhance empathy toward students' perspectives (e.g., Kadir et al., 2020; Zheng et al., 2020). Fourth, case studies and video analyses are employed to examine practical applications (Guay et al., 2016; Tessier et al., 2022). Additionally, these PD programs provide various resources, including websites, booklets, and detailed course plans (e.g., Niemiec & Muñoz, 2019) to reinforce learning.

Gaps and Holistic Approach in SDT-Based PD Programs

Despite the aforementioned strengths of current PD programs, notable deficiencies remain. A primary concern is a disproportionate emphasis on autonomy-supportive teaching strategies, often at the expense of the other two basic psychological needs of competence and relatedness. This imbalance can be dated back to Reeve and colleagues' foundational work in the 1990s and 2000s (e.g., Reeve, 1998; Reeve & Jang, 2006), which has significantly influenced the development of autonomy-supportive strategies within the SDT field. In contrast, less attention has been drawn toward the development of strategies that support competence and relatedness. To fill these gaps, our study incorporates strategies designed to (a) nurture a growth mindset, targeting students' competence development (Ronkainen et al., 2019; Seaton, 2018); and (b) address social-emotional learning (SEL) to meet students' needs

for relatedness (Bailey et al., 2019; Ferreira et al., 2020). The specific strategies will be elaborated in the Methods section.

Moreover, there are relatively inadequate PD programs for teachers working in disadvantaged, particularly African American, school communities, which are often characterized by teachers' high burnout rates, high turnover, and lower job satisfaction (Bottiani et al., 2019; Göregen et al., 2024; Simon & Johnson, 2015). Many existing PD programs are designed in school communities that are predominantly White and more affluent (e.g., Guay et al., 2016; Kiemer et al., 2018). There has been growing emphasis on designing PD programs that are grounded in the principles of community-engaged scholarship—that is, programs codeveloped with and responsive to the specific needs of local communities (Saltmarsh & Hartley, 2011; Sandmann et al., 2009).

Our study contributes to this effort by working with the Regional Inservice Education Center and teachers from historically underserved school districts. In this study, we refer to “underserved” or “disadvantaged” schools as those serving predominantly African American student populations in communities marked by concentrated poverty, underresourced facilities, and persistent teacher turnover. These schools often experience systemic barriers to educational equity, including limited access to instructional resources, fewer qualified teachers, and high accountability pressures. Such challenges are deeply intertwined with larger structural issues such as racialized school funding disparities, historical disinvestment in public education, and the lingering effects of segregation-era policies (Bottiani et al., 2019; National Research Council Institute of Medicine, 2004; Raver et al., 2016). These systemic factors contribute not only to declining academic outcomes but also to increased teacher burnout and diminished student motivation—making the need for targeted, contextually relevant PD programs all the more urgent. Together, we designed a PD program rooted in SDT to promote motivation-supportive teaching practices responsive to the realities faced by teachers in low-income, high-need schools.

Our program also introduces one-on-one mentorship sessions to address the unique challenges encountered in teaching. Evidence suggests that one-on-one mentorship can effectively meet individual needs and yield substantial long-term benefits in job performance and satisfaction (Eby et al., 2006; Mathur et al., 2013). Therefore,

the incorporation of this mentorship component into our PD program tends to benefit teachers' daily work.

Finally, existing PD offerings often overlook the interplay between motivation and emotion among students. This oversight is particularly significant given the documented decline in academic motivation of students with increasing negative emotions (e.g., anxiety and frustration), which can substantially impede their learning engagement (Arsenio & Loria, 2014). These emotions can stem from various factors, including economic hardship (e.g., poverty; Raver et al., 2016), biological changes (e.g., puberty; Theriot & Dupper, 2010), or global health crises (e.g., COVID-19; Wang et al., 2023). In response, integrating SEL strategies into SDT-based PD programs aims to equip teachers with effective tools for helping students manage their emotions in academic settings. These strategies particularly address the psychological need of relatedness, thereby enhancing the effects of SDT-based instructional interventions (e.g., Chiu et al., 2021; Gorissen et al., 2015).

To conclude, this paper introduces an enhanced PD program that integrates a diverse array of need-supporting strategies derived from SDT, growth mindset principles, and SEL. The program is specifically designed to meet the distinctive needs of teachers from disadvantaged school communities and address gaps in existing PD offerings. In this study, we will answer this research question: *Is the newly developed, comprehensive SDT-based PD program promising in enhancing teachers' instructional strategies?*

Method

Participants

The study's participants consisted of 10 middle and high school educators, of whom nine were female. Nine self-identified as African American, and one self-identified as American Indian. All participants held at least a bachelor's degree. Regarding teaching experiences, three educators had less than 5 years of experience, four had 6 to 10 years, and three had over 10 years. Their teaching subjects covered a wide range, including but not limited to science, reading, and mathematics. All participating teachers worked in Title I middle or high schools located in predominantly African American communities across rural and urban counties in Alabama. According to district reports, over 90% of the students in these schools identify as African American, and more than 85% qualify for free or reduced-price lunch. Many of the

schools experience high teacher turnover and report lower standardized test scores compared to state averages. These demographic and contextual factors underscore the systemic challenges that educators in these communities face, and they shaped the design and delivery of the PD program.

Procedures

The University's Institutional Review Board approved the project proposal. The PD initiative was implemented in partnership with the Regional Inservice Education Center, which supports 13 rural and urban counties in Alabama. This collaboration reflects the principles of reciprocal community engagement (Bringle & Clayton, 2012), wherein both university researchers and local educators contribute to and benefit from the knowledge cocreated through the PD process. Input from school leaders, teachers need assessments, and contextual challenges shaped the program's design and delivery, ensuring its relevance and local grounding.

An open call for participation in the current study was issued to teachers across partner school districts, and participants were selected on a first-come, first-served basis among eligible applicants. The study aimed to recruit 12 participants due to budgetary constraints and the pilot nature of the program. Consent was obtained from the first 12 eligible educators who responded to our recruitment outreach. However, two were unable to attend the training, resulting in a final cohort of 10. Participants in this study received \$400 and 12 Continuing Education Unit credits.

The PD program comprised four sessions:

- (1) Introduction to students' motivation
- (2) Autonomy-supportive teaching practice
- (3) Competence-supportive teaching practice
- (4) Relatedness-supportive teaching practice and emotional regulation

The four sessions were delivered on September 16 (Sessions 1 and 2) and 30, 2024 (Sessions 3 and 4), and each session lasted for about 6 hours. A week before the training, authors gathered baseline data through classroom observations, employing a checklist to assess teachers' motivation and emotion regulation strategies. Further details of the checklist are elaborated within the Measurement section of this paper.

At the beginning of the first PD session, participants completed a short survey to collect basic demographic data (such as age and gender) and a scale assessing their perceived motivation-promoting behaviors used in their classrooms.

The scale is discussed in the Measurement section below. Each whole day training was scheduled from 9:00 a.m. to 4:00 p.m., incorporating a 1-hour break for lunch. After each session, participants completed a paper-and-pencil quiz comprising 10 multiple-choice questions about the session content.

Immediately after the last session, participants completed a 10-item quiz on session content and a reassessment of their perceived motivation-promoting behaviors. Moreover, we conducted three focus-group interviews to gain more insights into participants' learning experiences. The interviews were audio-recorded and then transcribed verbatim.

We further arranged post-training coaching sessions with participating teachers to address specific teaching challenges. During the coaching sessions, the training team served as consultants, providing tailored support and potential solutions given each teacher's unique needs. The sessions were structured following a three-step process. First, teachers were asked to identify the most challenging aspect(s) of their teaching practice, particularly concerning student motivation. Next, they were encouraged to consider whether they had attempted to use specific need-supporting strategies to address their challenges. Finally, we commented on how to apply the identified strategies to support students' basic psychological needs. Teachers were invited to ask questions and discuss any uncertainties about implementing these strategies effectively. This structured approach ensured that the coaching sessions were focused, relevant, and practical, providing teachers with concrete steps to improve their teaching practices and enhance student motivation.

Three months after the last training session, follow-up classroom observations were conducted to reassess participants' understanding and application of SDT teaching strategies. This follow-up assessment utilized the identical checklist and the scale for perceived motivation-promoting behaviors used in baseline data gathering.

Measurement

To ensure we had a comprehensive understanding of the usefulness of the PD, we adopted Kirkpatrick and Kirkpatrick's (2006) four levels of training evaluation (see Table 1; Level 4 [Evaluating Outcome] was not included as it addresses student performance, which was beyond the scope of this study).

Level 1: Evaluating Reaction (Experience about Learning)

Teachers were divided into three focus

groups, with approximately three people in each group. Following Breen's (2006) guideline, they were asked to discuss the training in terms of its perspicuity (whether the lectures are easy to understand and follow), efficiency (whether the lecture is efficient in terms of delivering the knowledge), dependability (whether the strategies discussed in the PD are more effective than what they already know), stimulation (whether the PD will help them assist students better), and novelty (whether the PD is innovative and well-organized).

Level 2: Evaluating Learning (Knowledge Gains Through Learning)

Four quizzes were collaboratively developed by the first three authors. All quiz questions were closely aligned with the training content, learning objectives, and anticipated outcomes. We thoroughly reviewed the training materials and identified key concepts and skills for assessment. Subsequently, quiz items were drafted, reviewed, and refined. Multiple rounds of discussion and revision were involved to achieve consensus on the quiz content, format, and scoring criteria. Each quiz entailed 10 multiple-choice items, with 1 point earned for each item correctly answered.

Level 3: Evaluating Behavior (Perceived/Intended or Observed Classroom Application)

We used the Behavior Rating Scale (BRS; Cheon et al., 2012) to assess teachers' perceived application of motivation-promoting behaviors in the classroom. Participants were asked to rate seven teaching strategies—taking students' perspective, asking about students' interests, presenting learning activities in need-satisfying ways, providing explanatory rationales, acknowledging and accepting negative feelings, using non-pressuring and invitational languages, and displaying patience—according to how often believed they used them, using a 7-point Likert scale ranging from 1 (*never*) to 7 (*always*).

We further adapted the BRS and developed a checklist for observing teachers' applications of learned strategies in the classroom. The observation was administered 1 week before the training and 3 months following its conclusion, acknowledging that modifications in teaching style might need time to manifest. Using a dichotomous scale (where *Yes* = strategy used; *No* = strategy not used), Two raters had two 30-minute visits (before and 3 months after the training) of each teacher's classroom teaching and rated whether they instructed in a need-supportive way.

Table 1. Training Program Evaluation Plan

Assessment Time	Assessment Tool	Assessment Purpose
Before the training	Pre-survey	Level 3: Evaluate behaviors (perceived)
	Pre-classroom observation	Level 3: Evaluate behaviors (observed)
During the training	Four quizzes	Level 2: Evaluate learning
	Focus group interview	Level 1: Evaluate reaction (teachers' attitude toward the training and content)
	Post-survey	Level 3: Evaluate behaviors (perceived) (Short-term effect)
	Mentor session	Provide customized support
After the training	Post-classroom observation	Level 3: Evaluate behaviors (observed)
	Post-survey	Level 3: Evaluate behaviors (perceived) (Long-term effect)

Analysis

The feasibility and acceptability of the PD program were evaluated with both quantitative and qualitative procedures. In this study, we conceptualized *feasibility* as the extent to which teachers could engage with and implement the PD program components. This was evaluated through quiz completion and observed application of need-supportive strategies in classrooms. *Acceptability* referred to teachers' perceptions of the value and relevance of the PD content, assessed through focus group interviews (guided by Breen's five dimensions) and their reported intention to use strategies as captured by the BRS scale. Quantitative analyses included descriptive statistics on teachers' performance in four quizzes and their responses to the BRS. Given the small sample size of only 10 teachers, mixed-effects models were used to analyze BRS data collected at three time points. Mixed-effects models are particularly well-suited for small sample sizes and can account for the variability between teachers more effectively than repeated measures ANOVA (Gałeczki & Burzykowski, 2013; Muradoglu et al., 2023; Yu et al., 2024). This approach allowed us to account for intra-teacher correlations and variability in response trajectories. A power analysis was conducted with *R* using simulation techniques to evaluate the power of the mixed-effects models. The power analysis involved simulating 1000 data sets based on expected effect sizes for the fixed effects at T2 (0.4) and T3 (1.0). The results indicated a power of 83.90% (95% CI:

81.47%, 86.13%), suggesting that the study has sufficient power to detect significant effects for the specified parameters.

The qualitative data analysis used an inductive thematic approach to identify positive and negative feedback regarding the PD program. This approach, as described by Braun and Clarke (2006), is well-suited for uncovering patterns within narrative data without the constraints of a predefined coding framework, allowing themes to emerge organically from the data. Recordings of the focus group discussions were transcribed verbatim by a research assistant to maintain accuracy and authenticity in capturing participants' perspectives (Sandelowski, 1995). The coding process involved three authors who independently read the transcripts, applied open coding, and systematically highlighted key phrases that reflected participants' experiences and perceptions of the PD program. Following independent coding, the researchers convened to compare and discuss their initial codes, resolving discrepancies through consensus-based discussions. This step enhanced the reliability of the findings by ensuring that the codes accurately represented the data (Nowell et al., 2017). Once consensus was reached, the codes were collated into broader themes that encapsulated the essence of the focus group narratives. Themes were organized to reflect supportive and critical feedback, providing a comprehensive view of the participants' experiences with the PD program.

Lastly, we employed a dual-observer approach

(Cheon et al., 2012) to enhance the validity and reliability of our classroom observations using the checklist adapted from the BRS. This methodology involved having two independent observers apply the checklist concurrently in each classroom observation. Before the data collection phase, all observers (i.e., the first three authors and three trained graduate students) underwent rigorous training to understand the motivation-promoting behaviors outlined in the checklist and to practice calibrating their scoring methods. The training focused on building theoretical knowledge, applying it in practice, and ensuring high interrater reliability using a combination of discussions and exercises in simulated observation settings (Reeve, 2016). The training began with an introduction to the theoretical foundations and specific dimensions measured by the BRS, such as teachers' autonomy support, structure, and involvement. The first author was the trainer, and all others were trainees. The trainees were provided with detailed operational definitions and behavioral examples to help them understand each dimension clearly. Next, they engaged in guided practice sessions in which they observed video-recorded classroom scenarios and used the BRS to rate teacher behaviors. These practice sessions were followed by group discussions to clarify discrepancies and refine trainees' understanding of the coding criteria. All observers received feedback on their observations from experienced researchers (i.e., the first two authors) to enhance interrater reliability. This comprehensive training prepared graduate students to systematically and accurately evaluate teaching practices, contributing to high-quality observational research.

Interrater reliability was assessed using Cohen's Kappa, a statistical measure that evaluates the consistency of agreement between raters for quantitative data. Across all classroom observations, Cohen's Kappa values ranged from 0.53 to 1.0, reflecting agreements categorized as "fair" to "excellent" (Fleiss, 1981). We then reviewed the observations based on the ratings and identified changes in teachers' behaviors between the pre- and post-observation phases.

Results

Focus Group Interview Results

The focus group interviews offered valuable insights into participants' perceptions of the PD program. Feedback was overwhelmingly positive, with many praising the clarity and accessibility of the lectures. Participants frequently described

the content as "easy to understand" and "concise," though some expressed a need for more time to fully absorb theoretical components and advocated for an extended training period. One participant specifically suggested simplifying and clarifying the theory, noting that additional time spent on these concepts would improve their comprehension and application in the classroom.

Participants found several components of the training, such as role-plays and video examples, especially valuable. These elements offered real-life scenarios that helped bridge the gap between theory and practice. One teacher remarked, "I need a real-life scenario to apply this," highlighting the importance of practical application. The role-playing exercises were also well-received, with participants describing them as "cool" and "helpful" for understanding how to implement strategies in the classroom. While participants appreciated the content, some expressed uncertainty about implementing certain strategies in their classrooms. For instance, one teacher highlighted that although the one-on-one (student-to-teacher) feedback strategy was valuable, its practical application in a large classroom setting remained unclear. The need for more practical guidance and concrete examples of implementation emerged as a recurring theme.

A key point raised was the need for school-wide involvement. Teachers felt the strategies would be more effective if administrators were trained alongside them. They suggested that involving the entire school in the PD program would create a more supportive environment for implementing SDT strategies. As one participant noted, "[You need] the whole school kind of environment to support such strategies and it would actually work better than like individual teachers implementing those strategies."

Participants also discussed the logistical challenges of the training, expressing a preference for PD sessions to be scheduled during school hours or in the summer rather than on Saturdays. The stipend provided was appreciated, and participants emphasized that future PD programs should continue to offer financial incentives.

In summary, the focus group interviews underscored the perceived value of the PD program in helping teachers improve their classroom strategies. However, participants emphasized the need for additional time to fully grasp the theoretical content, increased practical implementation support, and greater involvement from school administration to ensure the success of SDT-based interventions.

Teacher Learning Results

Four quizzes were administered periodically to assess teachers' learning and comprehension of the training material. Each teacher answered eight or more questions correctly on every quiz, demonstrating the training program's effectiveness in conveying key concepts and strategies. The consistent high performance across all quizzes indicates that the training successfully enhanced teachers' understanding and retention of the material.

Teachers' Perceived/Intended Application of Motivation-Promoting Behaviors

The boxplots in Figure 1 illustrate the distribution of measurements across three time points (T1, T2, T3) for each of the seven questions. Questions Q1, Q2, Q4, and Q6 showed consistent responses over time, indicating stable attitudes or behaviors. In contrast, Questions Q3, Q5, and Q7 exhibited positive trends, suggesting improvements in using these strategies in the classroom. Notably, some questions, such as Q5, displayed more variability in responses, reflecting different experiences or attitudes among respondents.

Mixed-effects models were used to analyze the changes in teacher responses to the BRS over

time, with Time (T) as a fixed effect and teacher as a random effect. The results are summarized in Figure 1 and Table 2. Mixed-effects models revealed significant improvements in several teaching practices over time. For Question 1 (Q1), "Take the Students' Perspective," there was a significant increase at T3 ($\beta = 1.276$; $SE = 0.366$, $p < .01$), indicating enhanced perspective-taking. Similarly, Q3, "Present Learning Activities in Need-Satisfying Ways," showed a significant improvement at T3 ($\beta = 0.847$; $SE = 0.274$, $p < .01$). Q5, "Use Invitational Language," also exhibited a significant increase at T3 ($\beta = 1.275$; $SE = 0.433$, $p < .01$), the same for Q7, "Display Patience" ($\beta = 1.669$; $SE = 0.452$, $p < .001$). In contrast, Q2, "Invite Students to Pursue their Personal Interests," showed no significant changes over time ($\beta = 0.769$; $SE = 0.427$, $p = .07$). Similarly, Q4, "Provide Explanatory Rationales," remained consistent with no significant changes ($\beta = 0.263$; $SE = 0.448$, $p = .57$), and Q6, "Acknowledge Negative Feelings," also showed no significant changes ($\beta = -0.047$; $SE = 0.492$, $p = .92$). In summary, significant improvements were observed in specific teaching practices—taking students' perspectives, presenting learning activities in need-satisfying ways, using invitational language, and displaying patience.

Figure 1. Measurement Across Time

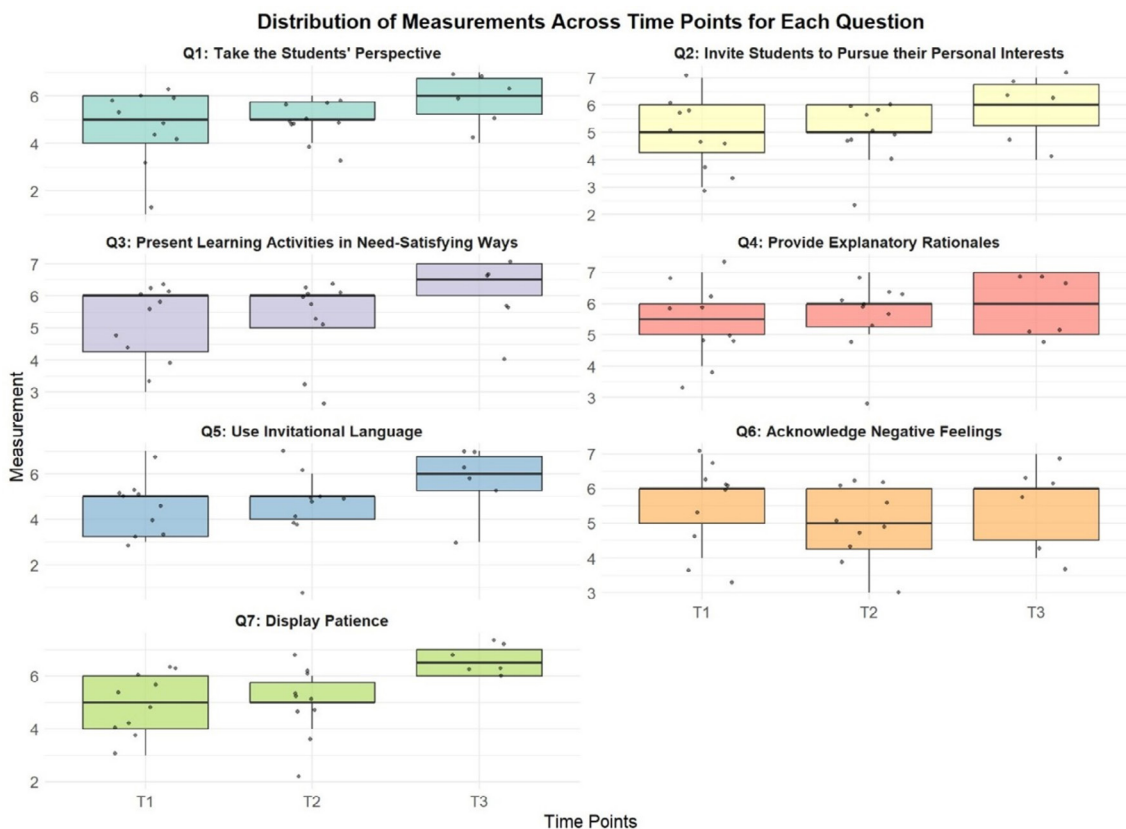


Table 2. Mixed-Effects Model Results for Each Question

Question	Parameter	Value	SE	<i>t</i>	<i>p</i> -value
Q1: Take the Students' Perspective	Intercept	4.600	.421	10.932	< .001
	Time 2	.400	.302	1.326	.19
	Time 3	1.276	.366	3.483	< .01
Q2: Invite Students to Pursue their Personal Interests	Intercept	5.000	.414	12.09	< .001
	Time 2	.000	.353	.00	1.00
	Time 3	.769	.427	1.80	.07
Q3: Present Learning Activities in Need-Satisfying Ways	Intercept	5.200	.372	13.980	< .001
	Time 2	.000	.225	.000	1.00
	Time 3	.847	.274	3.086	< .01
Q4: Provide Explanatory Rationales	Intercept	5.400	.376	14.366	< .001
	Time 2	.200	.373	.536	.60
	Time 3	.263	.448	.587	.57
Q5: Use Invitational Language	Intercept	4.500	.446	10.081	< .001
	Time 2	.100	.358	.280	.78
	Time 3	1.275	.433	2.943	< .01
Q6: Acknowledge Negative Feelings	Intercept	5.500	.374	14.716	< .001
	Time 2	-.500	.412	-1.215	.24
	Time 3	-.047	.492	-.096	.92
Q7: Display Patience	Intercept	4.900	.351	13.954	< .001
	Time 2	.100	.378	.265	.79
	Time 3	1.669	.452	3.692	< .001

Checklist Results

Classroom observations were conducted at two time points (pre-intervention and 3-month follow-up) to assess (using the checklist) the implementation of need-supportive teaching strategies introduced in the PD program. These observations provided insight into how teachers adopted and adapted the strategies over time.

Time 1 (T1) Observations: Baseline

At T1, the initial classroom observations revealed a mixed level of implementation of need-supportive behaviors. Teachers generally demonstrated some understanding of the concepts, but inconsistencies were noted in their application throughout lessons. For instance, while many teachers made efforts to establish clear goals and standards for students, some struggled to maintain this practice consistently. Several class sessions started with an outline of objectives, but reinforcement of these expectations during the session was limited.

Similarly, in terms of considering students' perspectives, teachers made initial attempts to

engage with students' viewpoints. However, the depth of this engagement often remained superficial, providing students with few opportunities for meaningful expression. The practice of giving students choices was also inconsistently applied. While some teachers supported student choices, such as selecting activities or topics, these choices were often constrained and did not fully promote student autonomy.

Encouraging collaboration varied significantly as well. Although group work and peer interactions were utilized in several classrooms, the structure and quality of these collaborative activities were not always effective in fostering meaningful student interaction. In summary, the observations at T1 indicated that while teachers used some need-supportive strategies, there was considerable room for improvement in making these practices more consistent and impactful.

Time 2 (T2) Observations: Post-Intervention

By T2, several positive developments were evident in the classroom observations, indicating that teachers had begun to implement the

strategies introduced in the PD program more effectively. One of the most notable changes was the increased emphasis on taking students' perspectives. Teachers became more intentional in creating opportunities for students to share their thoughts and connect lesson content to their own experiences. This shift not only enhanced student engagement but also fostered a more inclusive and supportive classroom environment.

The practice of giving students choices also showed marked improvement. By T2, more teachers allowed students to make meaningful decisions regarding their learning activities. For instance, students were often given the option to choose between different topics for group work or select their preferred presentation formats. This increased autonomy aligned with the program's goals of fostering student motivation by supporting their need for control over their learning process.

Furthermore, teachers became more consistent in offering clear goals and standards throughout their lessons. At T2, they not only articulated the objectives at the beginning of class but also reinforced these goals during the lesson using handouts, visual aids, or verbal reminders. This practice helped students stay focused and understand the expectations for their work more clearly, contributing to a more structured and organized learning environment.

Collaboration among students also improved by T2. Teachers incorporated more structured group activities that promoted peer interaction and cooperation. Group work became more intentional, with clear instructions and expectations provided to ensure effective collaboration. This shift reflected a stronger understanding of how to encourage students to work together in ways that supported their learning and engagement.

Overall, the comparison between the T1 and T2 observations demonstrated significant progress in teachers' implementation of need-supportive teaching strategies. The PD program effectively equipped teachers with the tools and understanding necessary to foster a more student-centered learning environment. Improvements in taking students' perspectives, offering choices, setting clear goals, and promoting collaboration highlight the program's impact on instructional practices. These findings suggest that with continued support and practice, teachers can further refine their approaches to create even more engaging and motivating classroom environments.

Discussion

This study investigated the impact of a SDT-based PD program on teachers' instructional practices in underserved school communities. This study contributes uniquely to SDT-based PD literature in several ways. First, while prior interventions often focused predominantly on autonomy-supportive practices (e.g., Reeve & Jang, 2006), our program intentionally integrates strategies aimed at supporting all three basic psychological needs—autonomy, competence, and relatedness—creating a more balanced and comprehensive approach. Second, we extend the scope of existing SDT frameworks by incorporating emotion regulation and SEL strategies to address the emotional realities of students in high-poverty classrooms, recognizing the interplay between affect and motivation. Third, the design and implementation of the PD were community-engaged, codeveloped with a regional in-service center that serves predominantly low-income African American communities in Alabama. This community-anchored approach grounds the intervention in local context, addressing structural inequities and responding directly to practitioner-identified needs. Moreover, there are mentoring sessions to provide follow-up personalized support to teachers. Together, these features offer a more holistic and context-sensitive model of SDT-based PD. The findings demonstrate significant improvements in teachers' adoption of SDT strategies, particularly in taking students' perspectives, offering choices, providing clear goals, and promoting collaboration. Below, we discuss the key findings, limitations, and implications for research and practice.

Positive Group Feedback

Participants' feedback during the focus group interviews highlighted several key strengths and areas for improvement within the PD program. Teachers found the lecture content to be clear, concise, and easy to understand. The role-playing activities and real-life scenarios were particularly appreciated, as they effectively bridged the gap between theory and practice. However, teachers expressed a desire for more time to digest the theoretical content and called for additional guidance on how to implement the strategies effectively in their classrooms. This aligns with Collins (2000), who emphasized the importance of balancing theoretical knowledge with practical application to maximize teacher learning. Additionally, participants suggested involving

school administrators in future PD programs, as broader school-wide support could enhance the success of implementing SDT strategies (Reeve & Jang, 2006).

Positive Learning Outcomes

The teacher learning outcomes, as measured by the four quizzes administered throughout the PD program, were uniformly high. Every teacher answered at least eight of the ten questions correctly on each quiz, demonstrating a strong grasp of the material. These results support the effectiveness of the PD program in conveying key concepts of SDT and related teaching strategies (Ryan & Deci, 2017). Moreover, they highlight the importance of continuous assessment that provides teachers with ongoing feedback on their learning progress in PD programs (Darling-Hammond et al., 2017). However, although the quiz results indicate high knowledge acquisition, it is essential to explore how well this knowledge translates into changes in instructional practices, as reflected in subsequent classroom observations and teacher behaviors.

Teachers' Perceived/Intended Application of Motivation-Promoting Behaviors

The results from the mixed-effects model revealed intriguing trends in teachers' behavioral intentions regarding the use of motivation-support strategies. Significant improvements were observed in areas such as taking students' perspectives, presenting learning activities in need-satisfying ways, and displaying patience—core aspects of creating a need-supportive classroom environment as identified by SDT (Cheon et al., 2012; Reeve, 2009). However, some strategies, such as inviting students to pursue personal interests and providing explanatory rationales, did not show significant changes. This suggests that while teachers are adopting certain SDT strategies, additional training may be necessary to help them fully integrate other key practices. Future PD programs could benefit from incorporating more focused coaching and opportunities for reflective practice to address these areas of inconsistency (Tessier et al., 2022).

Classroom Observations: T1 versus T2

Classroom observations at pre-intervention and at a 3-month follow-up provided further evidence of the positive impact of the PD program. At T1, baseline observations revealed an inconsistent application of SDT strategies, with teachers demonstrating partial success in

taking students' perspectives, offering choices, and fostering collaboration. However, by T2, notable improvements were observed across all key areas. Teachers became more intentional in providing opportunities for students to make meaningful decisions and consistently outlined clear goals and expectations throughout their lessons. These findings align with the findings from the teacher survey, as well as previous literatures, which showed that need-supportive teaching practices significantly enhance student motivation and engagement (e.g., Cheon et al., 2012; Reeve, 2024; Wang et al., 2024). Notably, the improvements in collaborative activities suggest that the PD program successfully encouraged teachers to create more cooperative learning environments, which are essential for promoting relatedness and student engagement (D. W. Johnson & Johnson, 2018).

Research and Practical Implications

This study has important implications for both research and practice. First, the findings support the growing body of literature that emphasizes the role of teacher PD in improving instructional practices and promoting student motivation (Darling-Hammond et al., 2017). By demonstrating that teachers can successfully adopt SDT-based strategies, this study highlights the potential of PD programs to foster student autonomy, competence, and relatedness—key drivers of intrinsic motivation and academic engagement (Deci & Ryan, 2016).

From a practical perspective, the inclusion of hands-on learning experiences, such as role-playing and real-life scenarios, was critical to the success of this PD program. Teachers benefit from opportunities to apply theoretical concepts in practical settings, reinforcing the importance of interactive learning in PD programs (Timperley et al., 2007).

Another practical implication is the need for ongoing support. The improvements in teachers' behaviors and the positive trends in classroom observations demonstrate that change is possible; however, teachers require continuous feedback and opportunities for reflection to fully integrate new strategies into their practice. Therefore, PD programs should incorporate long-term follow-up sessions to ensure that learning is sustained over time (Tessier et al., 2022). Moreover, teachers noted that sustained change would be more likely if SDT-based strategies were embraced at the school-wide level and supported by administrators. Aligning with prior research on systemic implementation

of motivation-supportive practices (Wang et al., 2024), future PD efforts should consider embedding such programs within broader district or policy-level training initiatives. This approach may help reinforce teacher learning, foster consistent language and expectations across classrooms, and enhance long-term impact.

By intentionally collaborating with local schools and centering teacher voices, this project embodies key tenets of community-engaged scholarship—namely, mutual benefit, responsiveness to community priorities, and sustainability (Furco & Moely, 2012; Saltmarsh & Hartley, 2011). Teachers' desire for broader school-wide involvement and follow-up coaching underscores the importance of systemic support, aligning with research on institutional change and embedded engagement (Kezar et al., 2015). Future efforts should continue to adopt a partnership-based approach to teacher PD, particularly in underserved school communities.

The context in which this PD program was delivered is essential to understanding its significance. Teachers in underserved schools face not only instructional challenges but also the compounding effects of socioeconomic stressors, racial inequity, and chronic underfunding. These factors shape both teacher well-being and student motivation in profound ways (Falk et al., 2019; Gore et al., 2021). These structural conditions can undermine the effectiveness of PD initiatives, making it essential to design programs that are contextually responsive and equity driven. Understanding how these factors interact with PD implementation can support more inclusive and sustainable professional learning experiences. Our partnership with the Regional Inservice Education Center reflects an intentional effort to respond to these realities by codeveloping a program rooted in both psychological theory and local experience. By equipping teachers with strategies that support students' autonomy, competence, and relatedness, we aim to help create more equitable and emotionally supportive learning environments—even within structurally constrained systems. In doing so, this project contributes to the broader goals of community-engaged scholarship: fostering reciprocal, capacity-building partnerships between universities and historically marginalized communities.

Limitations and Future Research

Despite these promising findings, there are limitations that future research should address.

First, the small sample size of only 10 teachers limits the generalizability of the results. Although the mixed-effects models provided adequate power to detect changes over time, future studies should replicate this work with larger and more diverse samples. Additionally, this study relied on self-reported measures of behavior, which might introduce bias. Incorporating objective measures, such as video analysis of classroom practices, can provide a more nuanced understanding of how teachers implement SDT strategies in real time (Roth et al., 2007).

Moreover, while this study focused on SDT-related strategies, future PD programs could benefit from integrating complementary frameworks, such as SEL and growth mindset theory. Both frameworks have been shown to support students' emotional regulation and resilience, particularly in challenging learning environments (Bailey et al., 2019; Dweck, 2006). Integrating SEL and a growth mindset into SDT-based PD programs could provide teachers with a more comprehensive approach to supporting their students' psychological and emotional needs.

Additionally, the unique demographic and structural contexts of the schools in this study—primarily low-income, high-turnover schools serving predominantly African American students—likely influenced the way teachers engaged with the PD content. Research suggests that PD initiatives in disadvantaged schools often encounter systemic barriers that may not be present in more affluent contexts (Odeh & Lach, 2024). Furthermore, culturally responsive pedagogy remains essential in professional learning, particularly given the growing diversity of the teacher and student population (Ladson-Billings, 2021; Matthews et al., 2024). While our findings demonstrate promising changes in teacher practices, future research should examine how similar SDT-based PD models perform across varied geographic and demographic settings to understand their scalability and cultural responsiveness.

Finally, while the PD program included follow-up coaching sessions, more structured and ongoing feedback can enhance the program's effectiveness. Teachers expressed a need for more continuous support in implementing the strategies learned, particularly in areas such as providing explanatory rationales and acknowledging students' negative feelings. Future research should explore the long-term impact of more frequent coaching sessions and reflective practice opportunities on teachers'

instructional behaviors and student outcomes (Timperley et al., 2007).

Conclusion

This study contributes to the growing body of literature on the effectiveness of SDT-based PD programs in promoting need-supportive teaching practices. By fostering autonomy, competence, and relatedness, teachers can create more engaging and motivating learning environments for their students. While the findings are promising, further research is needed to explore the long-term effects of these PD programs, particularly in underserved school communities. For school leaders and PD facilitators seeking to implement similar programs, our findings suggest several practical components that enhance effectiveness: (a) emphasizing active learning through role-playing and real-life scenarios; (b) incorporating post-training coaching tailored to teachers' individual classroom challenges; and (c) involving school administrators to create a supportive culture for instructional change. These features can be feasibly integrated into other PD efforts, especially in underserved school contexts. For researchers interested in replicating or extending this work, our mixed-methods design—combining pre/post self-report, observations, and focus groups—offers a flexible template for evaluating both short-term and long-term impacts of PD programs. In particular, the use of repeated classroom observations and the adapted BRS can help assess sustained changes in practice. Future studies might build on this framework by incorporating student outcome data or extending the observation timeline to capture delayed effects of teacher learning. Overall, this study underscores the importance of providing teachers with practical, hands-on tools and continuous support to help them integrate need-supportive strategies into their classrooms.

References

- Arsenio, W. F., & Loria, S. (2014). Coping with negative emotions: Connections with adolescents' academic performance and stress. *The Journal of Genetic Psychology*, 175(1), 76–90. <https://doi.org/10.1080/00221325.2013.806293>
- Bailey, R., Stickle, L., Brion-Meisels, G., & Jones, S. M. (2019). Re-imagining social-emotional learning: Findings from a strategy-based approach. *Phi Delta Kappan*, 100(5), 53–58. <https://doi.org/10.1177/0031721719827549>
- Bottiani, J. H., Duran, C. A., Pas, E. T., & Bradshaw, C. P. (2019). Teacher stress and burnout in urban middle schools: Associations with job demands, resources, and effective classroom practices. *Journal of School Psychology*, 77, 36–51. <https://doi.org/10.1016/j.jsp.2019.10.002>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Breen, R. L. (2006). A practical guide to focus-group research. *Journal of Geography in Higher Education*, 30(3), 463–475. <https://doi.org/10.1080/030982606000927575>
- Bingle, R. G., & Clayton, P. H. (2012). *Civic education through service learning: What, how, and why?* In L. McIlrath, A. Lyons, & R. Munck (Eds.), *Higher education and civic engagement* (pp. 101–124). Palgrave Macmillan. https://doi.org/10.1057/9781137074829_7
- Cheon, S. H., Reeve, J., & Moon, I. S. (2012). Experimentally based, longitudinally designed, teacher-focused intervention to help physical education teachers be more autonomy supportive toward their students. *Journal of Sport & Exercise Psychology*, 34(3), 365–396. <https://doi.org/10.1123/jsep.34.3.365>
- Chiu, T. K., Chai, C. S., Williams, P. J., & Lin, T. J. (2021). Teacher professional development on self-determination theory-based design thinking in STEM education. *Journal of Educational Technology & Society*, 24(4), 153–165.
- Collins, R. (2000). *Teachers' motivating styles and educational change* (Order No. 9986787). Available from ProQuest Dissertations & Theses Global. (304587628). <https://www.proquest.com/dissertations-theses/teachers-motivating-styles-educational-change/docview/304587628/se-2>
- Conesa, P. J., Onandia-Hinchado, I., Duñabeitia, J. A., & Moreno, M. Á. (2022). Basic psychological needs in the classroom: A literature review in elementary and middle school students. *Learning and Motivation*, 79, Article 101819. <https://doi.org/10.1016/j.lmot.2022.101819>
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017, June). *Effective teacher professional development*. Learning Policy Institute. https://learningpolicyinstitute.org/sites/default/files/product-files/Effective_Teacher_Professional_Development_REPORT.pdf
- Deci, E. L., & Ryan, R. M. (2016). Optimizing students' motivation in the era of testing and pressure: A self-determination theory perspective. In W. Liu, J. Wang, & R. Ryan (Eds.), *Building autonomous learners* (pp. 9–29). Springer, Singapore. https://doi.org/10.1007/978-981-287-630-0_2

- Dweck, C. S. (2006). *Mindset: The new psychology of success*. Random House.
- Eby, L. T., Durley, J. R., Evans, S. C., & Ragins, B. R. (2006). The relationship between short-term mentoring benefits and long-term mentor outcomes. *Journal of Vocational Behavior*, 69(3), 424–444. <https://doi.org/10.1016/j.jvb.2006.05.003>
- Falk, D., Varni, E., Johna, J. F., & Frisoli, P. (2019). Landscape review: Teacher well-being in low resource, crisis, and conflict-affected settings. *Education Equity Research Initiative*. [https://inee.org/sites/default/files/resources/TWB%20Landscape%20Review August%202019_0.pdf](https://inee.org/sites/default/files/resources/TWB%20Landscape%20Review%20August%202019_0.pdf)
- Ferreira, M., Martinsone, B., & Talić, S. (2020). Promoting sustainable social emotional learning at school through relationship-centered learning environment, teaching methods and formative assessment. *Journal of Teacher Education for Sustainability*, 22(1), 21–36. <https://doi.org/10.2478/jtes-2020-0003>
- Fleiss, J. L. (1981). *Statistical methods for rates and proportions* (2nd ed.). Wiley.
- Furco, A., & Moely, B. E. (2012). Using learning communities to build faculty support for pedagogical innovation: A multi-campus study. *The Journal of Higher Education*, 83(1), 128–153. <https://doi.org/10.1080/00221546.2012.11777237>
- Gałecki, A., & Burzykowski, T. (2013). *Linear mixed-effects model using R*. Springer.
- Göregen, M. S., Tanghe, E., & Schelfhout, W. (2024). What works to retain beginning teachers in the profession? A mixed methods approach to detect determining factors. *Education Sciences*, 14(12), 1319.
- Gore, J., Fray, L., Miller, A., Harris, J., & Taggart, W. (2021). The impact of COVID-19 on student learning in New South Wales primary schools: An empirical study. *The Australian Educational Researcher*, 48(4), 605–637.
- Gorissen, C. J., Kester, L., Brand-Gruwel, S., & Martens, R. (2015). Autonomy supported, learner-controlled or system-controlled learning in hypermedia environments and the influence of academic self-regulation style. *Interactive Learning Environments*, 23(6), 655–669. <https://doi.org/10.1080/10494820.2013.788038>
- Gottfried, A. E., Marcoulides, G. A., Gottfried, A. W., Oliver, P. H., & Guerin, D. W. (2007). Multivariate latent change modeling of developmental decline in academic intrinsic math motivation and achievement: Childhood through adolescence. *International Journal of Behavioral Development*, 31(4), 317–327. <https://doi.org/10.1177/0165025407077752>
- Guay, F., Valois, P., Falardeau, É., & Lessard, V. (2016). Examining the effects of a professional development program on teachers' pedagogical practices and students' motivational resources and achievement in written French. *Learning and Individual Differences*, 45, 291–298. <https://doi.org/10.1016/j.lindif.2015.11.014>
- Johnson, D. (2017). The role of teachers in motivating students to learn. *BU Journal of Graduate Studies in Education*, 9(1), 46–49.
- Johnson, D. W., & Johnson, R. T. (2018). Cooperative learning: The foundation for active learning. *Active Learning in Higher Education*, 19(1), 29–43. <https://doi.org/10.5772/intechopen.81086>
- Kadir, M. S., Yeung, A. S., Ryan, R. M., Forbes, A., & Diallo, T. M. (2020). Effects of a dual-approach instruction on students' science achievement and motivation. *Educational Psychology Review*, 32(2), 571–602. <https://doi.org/10.1007/s10648-018-9449-3>
- Kezar, A., Gehrke, S., & Elrod, S. (2015). Implicit theories of change as a barrier to change on college campuses: An examination of STEM reform. *The Review of Higher Education*, 38(4), 479–506. <https://doi.org/10.1353/rhe.2015.0026>
- Kiemer, K., Gröschner, A., Kunter, M., & Seidel, T. (2018). Instructional and motivational classroom discourse and their relationship with teacher autonomy and competence support—findings from teacher professional development. *European Journal of Psychology of Education*, 33, 377–402. <https://doi.org/10.1007/s10212-016-0324-7>
- Kirkpatrick, J. D., & Kirkpatrick, W. K. (2016). *Kirkpatrick's four levels of training evaluation*. Association for Talent Development.
- Ladson-Billings, G. (2021). Three Decades of Culturally Relevant, Responsive, & Sustaining Pedagogy: What Lies Ahead? *The Educational Forum*, 85(4), 351–354. <https://doi.org/10.1080/00131725.2021.1957632>
- Mathur, S. R., Gehrke, R., & Kim, S. H. (2013). Impact of a teacher mentorship program on mentors' and mentees' perceptions of classroom practices and the mentoring experience. *Assessment for Effective Intervention*, 38(3), 154–162. <https://doi.org/10.1177/1534508412457873>
- Matthews, J. S., Boomhower, K. M., & Ekwueme, C. (2024). Assimilationist, reformist, and sociopolitical phases of school belonging research: A critical race and optimal distinctiveness review. In A. J. Elliot (Ed.), *Advances in motivation science* (Vol. 11, pp. 171–213). Elsevier. <https://doi.org/10.1016/bs.adms.2023.12.001>

- Miyamoto, A., Murayama, K., & Lechner, C. M. (2020). The developmental trajectory of intrinsic reading motivation: Measurement invariance, group variations, and implications for reading proficiency. *Contemporary Educational Psychology*, 63, Article 101921. <https://doi.org/10.1016/j.cedpsych.2020.101921>
- Muradoglu, M., Cimpian, J. R., & Cimpian, A. (2023). Mixed-effects models for development researchers. *Journal of Cognition and Development*, 24(3), 307–340. <https://doi.org/10.1080/15248372.2023.2176856>
- National Research Council Institute of Medicine. (2004). *Engaging schools: Fostering high school students' motivation to learn*. National Academies Press.
- Niemiec, C. P., & Muñoz, A. (2019). A need-supportive intervention delivered to English language teachers in Colombia: A pilot investigation based on self-determination theory. *Psychology*, 10(7), 1025–1042. <https://doi.org/10.4236/psych.2019.107067>
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1). <https://doi.org/10.1177/1609406917733847>
- Bani Odeh, K., & Lach, L. M. (2024). Barriers to, and facilitators of, education for children with disabilities worldwide: a descriptive review. *Frontiers in public health*, 11, 1294849.
- Raver, C. C., Roy, A. L., Pressler, E., Ursache, A. M., & Charles McCoy, D. (2016). Poverty-related adversity and emotion regulation predict internalizing behavior problems among low-income children ages 8–11. *Behavioral Sciences*, 7(1), 2. <https://doi.org/10.3390/bs7010002>
- Reeve, J. (1998). Autonomy support as an interpersonal motivating style: Is it teachable? *Contemporary Educational Psychology*, 23(3), 312–330. <https://doi.org/10.1006/ceps.1997.0975>
- Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist*, 44(3), 159–175. <https://doi.org/10.1080/00461520903028990>
- Reeve, J. (2016). Autonomy-supportive teaching: What it is, how to do it. In W. C. Liu, J. C. K. Wang, & R. M. Ryan (Eds.), *Building autonomous learners: Perspectives from research and practice using self-determination theory* (pp. 129–152). Springer Singapore. https://doi.org/10.1007/978-981-287-630-0_7
- Reeve, J. (2024). *Understanding motivation and emotion*. John Wiley & Sons.
- Reeve, J., & Cheon, S. H. (2024). Learning how to become an autonomy-supportive teacher begins with perspective taking: A randomized control trial and model test. *Teaching and Teacher Education*, 148, Article 104702. <https://doi.org/10.1016/j.tate.2024.104702>
- Reeve, J., & Jang, H. (2006). What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology*, 98(1), 209–218. <https://doi.org/10.1037/0022-0663.98.1.209>
- Ronkainen, R., Kuusisto, E., & Tirri, K. (2019). Growth mindset in teaching: A case study of a Finnish elementary school teacher. *International Journal of Learning, Teaching and Educational Research*, 18(8), 141–154. <https://doi.org/10.26803/ijlter.18.8.9>
- Roth, G., Assor, A., Kanat-Maymon, Y., & Kaplan, H. (2007). Autonomous motivation for teaching: How self-determined teaching may lead to self-determined learning. *Journal of Educational Psychology*, 99(4), 761–774. <https://doi.org/10.1037/0022-0663.99.4.761>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.
- Ryan, R. M., Ryan, W. S., Di Domenico, S. I., & Deci, E. L. (2019). The nature and the conditions of human autonomy and flourishing: self-determination theory and basic psychological needs. In R. M. Ryan (Ed.), *The Oxford handbook of human motivation* (2nd ed., pp. 89–110). Oxford University Press. <https://doi.org/10.1093/oxfordhnb/9780190666453.013.6>
- Saltmarsh, J., & Hartley, M. (Eds.). (2011). *“To serve a larger purpose”: Engagement for democracy and the transformation of higher education*. Temple University Press.
- Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing & Health*, 18(2), 179–183. <https://doi.org/10.1002/nur.4770180211>
- Sandmann, L. R., Thornton, C. H., & Jaeger, A. J. (2009). Institutionalizing community engagement in higher education: The first wave of Carnegie classified institutions. *Jossey Bass*.
- Schuitema, J., Peetsma, T., & van der Veen, I. (2016). Longitudinal relations between perceived autonomy and social support from teachers and students' self-regulated learning and achievement. *Learning and Individual Differences*, 49, 32–45. <https://doi.org/10.1016/j.lindif.2016.05.006>

Seaton, F. S. (2018). Empowering teachers to implement a growth mindset. *Educational Psychology in Practice*, 34(1), 41–57. <https://doi.org/10.1080/02667363.2017.1382333>

Simon, N., & Johnson, S. M. (2015). Teacher turnover in high-poverty schools: What we know and can do. *Teachers College Record*, 117(3), 1–36. <https://doi.org/10.1177/016146811511700305>

Tessier, D., Ginoux, C., & Shankland, R. (2022). *Promoting motivation and well-being at school: The effect of a teacher training combining a self-determination theory-based intervention and positive psychology interventions*. OSF Preprints. <https://doi.org/10.31219/osf.io/nkrdz>

Theriot, M. T., & Dupper, D. R. (2010). Student discipline problems and the transition from elementary to middle school. *Education and Urban Society*, 42(2), 205–222. <https://doi.org/10.1177/0013124509349583>

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration (BES)*. New Zealand Ministry of Education. <https://www.educationcounts.govt.nz/publications/series/2515/15341>

Vedder-Weiss, D., & Fortus, D. (2011). Adolescents' declining motivation to learn science: Inevitable or not? *Journal of Research in Science Teaching*, 48(2), 199–216. <https://doi.org/10.1002/tea.20398>

Yu, W., Elliott, M., & Raghunathan, T. (2024). Three approaches to improve inferences based on survey data collected with mixed-mode designs. *Journal of Survey Statistics and Methodology*, 12(3), 814–839. <https://doi.org/10.1093/jssam/smae012>

Wang, Y., Tian, L., & Huebner, E. S. (2019). Basic psychological needs satisfaction at school, behavioral school engagement, and academic achievement: Longitudinal reciprocal relations among elementary school students. *Contemporary Educational Psychology*, 56, 130–139. <https://doi.org/10.1016/j.cedpsych.2019.01.003>

Wang, Y., Wang, H., Wang, S., Wind, S. A., & Gill, C. (2024). A systematic review and meta-analysis of self-determination-theory-based interventions in the education context. *Learning and Motivation*, 87, Article 102015. <https://doi.org/10.1016/j.lmot.2024.102015>

Wang, Y., Xia, M., Guo, W., Xu, F., & Zhao, Y. (2023). Academic performance under COVID-19: The role of online learning readiness and emotional competence. *Current psychology*, 42(34), 30562–30575.

Williams, D. R., Brule, H., Kelley, S. S., & Skinner, E. A. (2018). Science in the Learning Gardens (SciLG): A study of students' motivation, achievement, and science identity in low-income middle schools. *International Journal of STEM Education*, 5(1), Article 8. <https://doi.org/10.1186/s40594-018-0104-9>

Zheng, F., Hu, P., Lian, Z., Wang, Y. L., Wu, S., & Li, H. (2020). Contributing factors to the improvement of international students' health literacy in China: A self-determination theory perspective. *Frontiers in Public Health*, 8, Article 390. <https://doi.org/10.3389/fpubh.2020.00390>

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