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# Intrinsic instructional goal adoption increases autonomy-supportive teaching: A randomized control trial and intervention

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ABSTRACT

Goal contents theory (GCT) stresses the benefits of intrinsic goal pursuit. To extend this research to teachers, the present investigation conducted two experiments to apply GCT's principles to the classroom to test for the causal, facilitating effect of teachers' intrinsic instructional goals on the new benefit of autonomy-supportive teaching. Study 1 was a laboratory study with 156 college students randomly assigned into one of three conditions: intrinsic instructional goal-personal growth, intrinsic instructional goal-relationship growth, or no-goal. Planned comparisons showed that teachers who pursued an intrinsic instructional goal showed more autonomy-supportive teaching than did teachers in the no-goal condition. Study 2 was a classroom-based intervention with 26 experienced K-12 teachers and their 538 students. Teachers were randomly assigned into either an intrinsic instructional goal intervention or a no-intervention control condition. Repeated-measures ANCOVAs showed that intrinsic instructional goals were malleable and led to significantly greater autonomy-supportive teaching, according to trained raters and teachers but not their students. Teachers in the intervention condition also reported greater need satisfaction and teaching efficacy. These findings confirm the teacher benefits of adopting intrinsic instructional goals and therefore open up a new and promising area for future research.

Goal Contents Theory (GCT; Kasser & Ryan, 1993, 1996), one of the mini-theories within the larger Self-Determination Theory framework (SDT; Ryan & Deci, 2017), focuses on the content of people's life aspirations. Any goal or aspiration is a forward-looking desired end-state (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010), but the pursuit of some goals puts the goal-striver on an inwardly-oriented pathway of activity that affords frequent and recurring opportunities to experience satisfaction of the psychological needs of autonomy, competence, and relatedness while the pursuit of other goals puts the goal-striver on an outwardly-oriented pathway that affords few such opportunities for need satisfaction. Goal strivings that open up opportunities for frequent need satisfaction are referred to as intrinsic goals, while goal strivings that are unrelated to or that detract the person away from opportunities for need satisfaction are referred to as extrinsic goals (Kasser & Ryan, 1993, 1996).

Because intrinsic goals open up opportunities for need satisfaction while extrinsic goals tend to close them off, the core proposition of GCT is that "all goals are not created equal" (Ryan, Sheldon, Kasser, & Deci, 1996, p. 21). While most goal theories stress the beneficial after-effects from the attainment of any attractive and personally-valued goal (Locke & Latham, 1990), the unique contribution of GCT is to show that the pursuit (and attainment) of an intrinsic goal is more beneficial than is the pursuit (and attainment) of an extrinsic goal (Kasser et al., 2014; Niemiec, Ryan, & Deci, 2009; Ryan et al., 1996; Schmuck, Kasser, & Ryan, 2000). In the context of education, this distinction between intrinsic vs. extrinsic goals is important because when teachers encourage intrinsic instructional goals then students are more likely to experience need satisfaction and, because of this, display higher engagement, learning, and well-being, compared to when teachers encourage extrinsic instructional goals (Jang, 2019). In a study of parental support, for instance, the more students perceived that their parents encouraged their adolescent children to pursue high (rather than only moderate) intrinsic goals, the better were students' grades, effort regulation, and school functioning in general (Mouratidis, Vansteenkiste, Lens, Michou, & Soenens, 2013).

GCT's intrinsic vs. extrinsic framework can be applied to the lesson-specific priorities and aspirations teachers bring with them into the classroom (Jang, 2019). Table 1 illustrates how GCT's intrinsic and extrinsic life goals can be translated into the intrinsic and extrinsic instructional goals central to teaching. According to GCT, prototypical

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**Table 1**
Name and conceptual definition for teachers' intrinsic and extrinsic instructional goals.

| General Life Goal | Instructional Goal |
|---|---|
| **Intrinsic Goals**<br>Aspiration and pursuit that inherently satisfies basic needs such as personal growth, close relationships, and community contribution | **Personal Growth**<br>Pursue students' interests and dreams, psychological growth, and positive self-development.<br>**Relationship Growth**<br>Pursue students' closer peer relationships and contribute to a more prosocial world. |
| **Extrinsic Goals**<br>Aspiration and pursuit that require contingent rewards or affirmation from others such as money, fame, and image. | **High Scores**<br>Pursue socially-valued indicators of academic success, such as high grades and standardized test scores as well as entrance to prestigious schools.<br>**Assured Success**<br>Pursue social compliments, approval, and status valued by educational stakeholders. |

intrinsic life goals include those for personal growth, close relationships, and community contribution, so the corresponding prototypical intrinsic instructional goals would be those for personal growth and relationship growth (the latter is a combination of the close relationships and community contribution goals; Jang, 2019). The reason why personal growth goals represent prototypical intrinsic instructional goals is because their pursuit is strongly predictive of experiences of autonomy and competence satisfaction, while the reason why relationship growth goals represent prototypical intrinsic instructional goals is because their pursuit is strongly predictive of experiences of autonomy and relatedness satisfaction (Niemiec et al., 2009), though a goal is intrinsic because of its association with general need satisfaction rather than with a particular type of need satisfaction. Similarly, prototypical extrinsic life goals include those for contingent rewards or affirmation from others (i.e., materialistic goals, such as those for money, fame, and image), so the corresponding prototypical extrinsic instructional goals would be those for socially-valued indicators of academic success (i.e., "educational materialism"; Jang, 2019), such as high grades and entrance to prestigious schools. The reason why goals for educational materialism represent prototypical extrinsic instructional goals is because their pursuit has little or no relation to autonomy, competence, or relatedness satisfaction (Niemiec et al., 2009). Importantly, intrinsic and extrinsic goals are both attractive and personally-valued pursuits, but the key distinction is that the former afford opportunities for need satisfaction while the latter do not.

## 1. Teachers' intrinsic instructional goals

An intrinsic instructional goal is a teacher-focused goal, as it represents what the teacher aspires to attain during the lesson. With an intrinsic instructional goal, what teachers aspire to bring about is a student episode of either personal growth or relationship growth. To do this, teachers typically insert such an aspiration into their lesson plan as a desired-end state to pursue during the lesson (e.g., "objectives"). At the beginning of a lesson, the teacher introduces the goal to the students. The teacher then structures the learning activity to help students pursue the attainment of that (personal or relationship growth) goal. The teacher is therefore the unit of analysis and, because of this, our focus in the present study was on the *benefits to teachers* of their intrinsic instructional goal pursuits. Specifically, in Study 1 we focused on the teacher benefit of an autonomy-supportive motivating style, though we also focused on teachers' need satisfaction and teaching efficacy in Study 2. We considered autonomy-supportive teaching to be a teacher benefit because it is associated with both high teaching skill (Reeve, Jang, Carrell, Jeon, & Barch, 2004) and well-being indicators such as job satisfaction, vitality, and passion (Cheon, Reeve, Yu, & Jang, 2014).

Jang (2019) showed that teachers who adopt and build their classroom instruction around intrinsic instructional goal pursuits tend to rely on an autonomy-supportive motivating style, while teachers who adopt and build their classroom instruction around extrinsic instructional goal pursuits tend to rely on a controlling motivating style. With an autonomy-supportive style the teacher focuses on the student, adopts an interpersonal tone of understanding, and then expresses that student-focus and understanding tone through specific instructional behaviors such as taking the students' perspective and inviting and responding to students' input and suggestions; with a controlling style the teacher focuses on a teacher-prescribed outcome, adopts an interpersonal tone of pressure, and then expresses that outcome-focus and pressuring tone through specific instructional behaviors such as telling students what to do and applying pressure until students do as they are told (Aelterman et al., 2019; Reeve, 2009). Which motivating style the teacher tends to rely on during instruction has important implications for students' classroom motivation and functioning because the autonomy-supportive style promotes adaptive functioning and well-being while the controlling style promotes maladaptive functioning and ill-being (Assor, Kaplan, & Roth, 2002; Cheon, Reeve, & Moon, 2012; Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015; Patall et al., 2018).

Jang's (2019) pioneering study showed was that endorsing an intrinsic instructional goal was correlated with endorsing an autonomy-supportive style, just as endorsing an extrinsic instructional goal was correlated with endorsing a controlling style. However, correlational research cannot determine the nature of this relationship, as it is just as likely that a teacher's motivating style leads to his or her adoption of a particular instructional goal as it is that a teacher's instructional goal leads to his or her adoption of a particular motivating style. Thus, we conducted two studies to investigate the causal, facilitating effect of adopting an intrinsic instructional goal on teachers' greater reliance on autonomy-supportive teaching.

We expected that teachers who were randomly assigned to pursue an intrinsic instructional goal would teach in an autonomy-supportive way. We represent this hypothesized connection between intrinsic goal adoption and autonomy-supportive teaching in Fig. 1 as a two-step process. The reason why we expected the adoption of an intrinsic instructional goal to exert a causal, facilitating effect on teachers' subsequent autonomy-supportive teaching was two-fold.

First, as shown in Fig. 1, we expected intrinsic goal adoption and autonomy-supportive teaching to represent two distinct, but interconnected, processes. What the adoption of an intrinsic instructional goal does is to orient the teacher toward a basic student-focused attitude and an interpersonal tone of understanding (process 1 in Fig. 1). Basic attitude refers to how student- (rather than self-) focused the teacher is (Vansteenkiste, Aelterman, Haerens, & Soenens, 2019), and an intrinsic goal orients the teacher to transcend his or her own perspective and ego to instead focus on students' concerns (Yeager et al., 2014), such as promoting their personal and relationship growth. An interpersonal tone

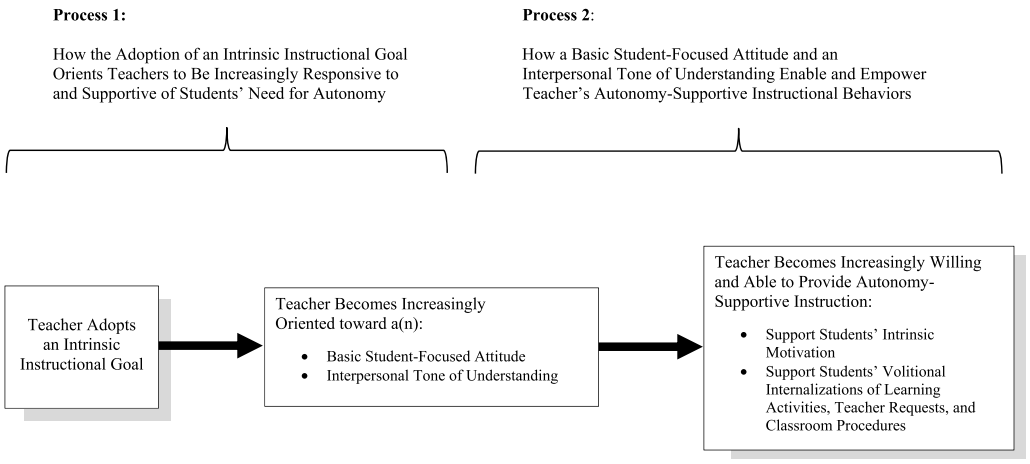


**Fig. 1.** Two-step process to explain how the adoption of an intrinsic instructional goal orients teachers toward autonomy-supportive teaching.

of understanding refers to an empathic quality to understand what students want and need (Aelterman et al., 2019), and an intrinsic instructional goal orients the teacher to listen, to understand, and to create the classroom conditions that can support students' strivings for personal and relationship growth. Once adopted, a more student-focused attitude and an understanding tone together enable, foreshadow, and empower the teacher's forthcoming autonomy-supportive instructional behaviors (process 2 in Fig. 1), because these are the twin foundations to autonomy-supportive teaching (Reeve and Cheon, 2020). In a nutshell, the adoption of an intrinsic instructional goal is both a prerequisite and a catalyst to autonomy-supportive teaching.

The second reason why we expected the adoption of an intrinsic instructional goal to exert a causal, facilitating effect on autonomy-supportive teaching was that we recognized the temporal sequence of events between setting a goal on the one hand and actually pursuing its attainment on the other. A goal is a forward-looking desired end state that teachers establish prior to the lesson, as in formulating and writing down the learning objective(s) for the class period. Once the goal is set, it is then pursued, and that goal pursuit takes the form of what teachers say and do during instruction to attain the sought-after goal. The ideal way that teachers can pursue their intrinsic instructional goals is, we suggest, to engage in autonomy-supportive teaching. Hence, adopting an intrinsic instructional goal is goal setting, while autonomy-supportive teaching is goal pursuit.

In Study 1, we created a teaching situation in which the teacher taught a pair of students for the first time. By creating this sort of teaching situation, we could know that the instructional goal that the teacher set and pursued was experimentally manipulated to occur first while the instructional behavior the teacher enacted to pursue that goal would always occur second. This laboratory setting therefore allowed us to rule out the possible reciprocal and confounding effect that the teacher's motivating style might have on his or her tendency to adopt an intrinsic vs. extrinsic instructional goal. That is, in this situation, autonomy-supportive teaching could not cause the adoption of an intrinsic instructional goal because no autonomy-supportive teaching would occur before teachers were assigned to adopt and pursue the intrinsic instructional goal. In Study 2, we extended our effort to examine the hypothesized causal, facilitating effect that intrinsic instructional goals might have on autonomy-supportive teaching by having experienced teachers participate in an intervention to learn how to set and pursue intrinsic instructional goals in their own classrooms with their own students.

## 2. Study 1

Study 1 was conducted in a laboratory setting to investigate whether or not teachers' intrinsic instructional goal could be experimentally manipulated and, if so, whether that manipulated intrinsic instructional goal would then increase the autonomy-supportive motivating style. Study 1 randomly allocated undergraduate students into the roles of teacher or student (1 teacher, 2 students) and then randomly assigned the triad into one of three experimental conditions (independent variable): intrinsic instructional goal-personal growth; intrinsic instructional goal-relationship growth; and a no-goal control group. The dependent measures were the two aspects of teachers' motivating styles—autonomy support and teacher control, and these dependent measures were assessed through three informants—teachers' self-reports, students' perceptions, and raters' objective scoring of teachers' actual autonomy-supportive and controlling instructional behavior during the teaching session. We collected dependent measures from three different informants because most of the variance in motivating style score for students who have the same teacher are due to differences between students, which implies that students do not perceive their teacher's motivating style in the same way (Van den Berghe, Tallir, Cardon, Aelterman, & Haerens, 2015). Similarly, classroom raters score a teacher's general motivating style with all students rather than the teacher's motivating style toward each individual student. Because of these differences, we expected the degree of convergence between teachers', students', and raters' scores on the same dependent measure to be significant but relatively low and to provide three somewhat different readouts on the same phenomenon, which was the teacher's motivating style (based on Haerens et al., 2013). *Hypothesis 1* predicted that teachers in both intrinsic instructional goal groups would display a more autonomy-supportive motivating style than would teachers in the control group, and that this would be true for teachers', students', and raters'. Supplementary *hypothesis 2* predicted that teachers in both intrinsic instructional goal groups would display a less controlling motivating style than would teachers in the control group (across all three informants), because experimental manipulations that increase autonomy-supportive teaching also tend to decrease controlling teaching (Cheon, Reeve, & Song, 2016; McLachlan & Hagger, 2010).

### 2.1. Method

#### 2.1.1. Participants

Participants were 156 (69 males, 87 females) college students with an average age of 22.1 ($SD = 2.1$) years old. Participants were recruited through an online portal of a college students' community website in Seoul, South Korea. The participants received a gratuity equivalent to a small gift. Prior to participant recruitment, we considered the teacher and student sample sizes needed to adequately power our statistical tests. For the teacher and rater data, we tested our hypotheses using an independent two-group *t*-test. The minimal sample size of teachers needed for such an analysis that used conventional statistics (*alpha* = 0.05, two-tailed, *power* = 0.90) to detect a large effect ($d = 0.87$, based on the correlations reported by Jang, 2019, see Tables 7 and 8) when the *N* in one group (experimental) is twice as large as the *N* in the other group (control) would be 66, based on Faul, Erdfelder, Lang & Buchner's (2007) G*Power 3 software program. Because our analyzed teacher sample size was $N = 52$, we knew in advance that our hypothesis tests were somewhat under-powered (i.e., conservative). For the student data, we tested our hypotheses using a 2-level hierarchical model analysis, because students were nested within teachers. To evaluate the adequacy of our sample combination ($k = 52$ teachers/cluster = 2 students) for a two-group comparison, we applied Arend and Schäfer (2019) recommendations (*alpha* = 0.05, $d \geq 0.80$, repetition = 1000) for two-level models and the R statistical package. This analysis showed our sample combination had medium power of 30% (small = 0.10, medium = 0.30, and large = 0.50).

#### 2.1.2. Experimental design and procedure

The present research was approved by the Institutional Review Board of the first author's university. Following a randomized control trial, we used web based random assignment program to allocate experimental condition with no blocking for unbalanced cell size. The experimental design was adopted from the previously validated teacher-student paradigm to depict a laboratory-based teaching situation (Deci, Spiegel, Ryan, Koestner, & Kauffman, 1982). In the traditional teacher-student paradigm, participants are recruited in same-gender pairs and randomly allocated into the role of either the teacher or the student (Deci et al., 1982; Reeve & Jang, 2006). In the present study, however, participants were recruited in same-gender triads with one teacher and two students. This dyad-to-triad adaptation was necessary because one condition (i.e., relationship growth goal) required the presence of two students that could enable teacher-promoted student--student interaction.

The experiment's procedural timeline appears in Fig. 2. The experiment began with the experimenter escorting the teacher into one room, while the two students waited in a separate waiting room (13 min). After the teacher completed the goal manipulation session, the teacher and students were brought back together in the experimental room to conduct the teaching session (15 min). Next, the experimenter escorted the teacher back to the teacher's room to complete a post-experimental questionnaire (15 min), Student 1 stayed in the experimental room to complete the questionnaire, and student 2 went into an extra (third) room to complete the (same) questionnaire. All participants were debriefed individually.

***Goal Manipulation Session.*** The experimenter first introduced the teacher to the learning task, which was the Happy Cubes puzzle (Reeve, 1989, Study 2). To conduct the intrinsic instructional goal manipulation, the experimenter next gave the teacher-participant one of the three two-part instructional booklets. Part 1 simply identified the teacher's instructional goal to be pursued during the teaching session (based on the conceptual definitions recommended by Jang (2019)): (1) "Promote skill development for your two students" for the intrinsic instructional goal-personal growth condition; (2) "Promote a close relationship between your two students" for the intrinsic instructional goal-relationship growth condition; or (3) "Teach your two students" for the no-goal control condition. Part 2 provided the teacher with a step-by-step guide on how to solve each of the puzzle-solving solutions to be taught to the students during the teaching session. The Part 2 contents of the booklet were the same across all three conditions/booklets. The experimenter told the teacher-participant that his or her task was to teach the students how to solve the puzzle by pursuing the instructional goal featured in Part 1 of the booklet.

After inducing the teachers' instructional goal, the experimenter returned to the original waiting room where the two student-participants were simply waiting. The experimenter escorted the student-participants to the experimental room in which the teaching session would occur to sit side-by-side at the rectangular table in which two puzzles (one for each student) and 10-set solution replicas of the Happy Cubes lay in the middle of the table. After the students were seated, the experimenter said, "Today you will learn how to solve this puzzle. As a student your task is to learn about the puzzle and solve as many solutions as possible". The experimenter then left to get the teacher and to escort him or her to the experimental room to sit on the opposite side of the table from the two students-participants.

***Teaching Session.*** The experimenter began the teaching session by saying to the teacher, "Now, please instruct the puzzle-solving class as you prepared", and then left. The teaching-learning experimental session lasted 15 min, and the session was videotaped (with participants' awareness and consent). After 15 min, experimenter re-entered the experimental room, announced that the puzzle-solving session was over, the experimenter escorted the two student-participants to their adjacent rooms, and each participant completed his or her respective post-experimental questionnaire in his or her own separate room (as per Fig. 2).

### 2.2. Measures

Dependent measures were collected from three informants: teacher-report, student-report, and observers' rating. All questionnaires used in Study 1 were originally developed in English, but a previously-translated Korean version of each scale was available from published work (Cheon et al., 2012; Cheon, Reeve, & Ntoumanis, 2018; Jang, 2019). All scales used a 7-point bipolar response scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*), except for the Teacher Goal Questionnaire that used a unipolar response scale (1 = *Not at All Important*; 7 = *Very Important*).

***Manipulation Check.*** To assess teachers' intrinsic instructional goals, teachers completed the Teacher Goal Questionnaire (TGQ; Jang, 2019). The TGQ has 16-items to measure intrinsic and extrinsic instructional goals, but we used only the 8-items from the two intrinsic instructional goal scales for the research purpose. The TGQ features the sentence stem, "How important was this goal to you when providing instruction?" The 8-item intrinsic instructional goal scale included four items to assess the personal growth instructional goal, "Invite students to learn new things" and four items to assess the relationship growth instructional goal, "Promote deeper, more intimate relationships among students". Internal consistency for the 8-item intrinsic instructional goal scale was $\alpha = 0.86$.

***Motivating Styles.*** To assess students' perception of the teacher's motivating styles, students completed the 6-item Learning Climate Questionnaire (LCQ; Williams & Deci, 1996; "My teacher listens to how I

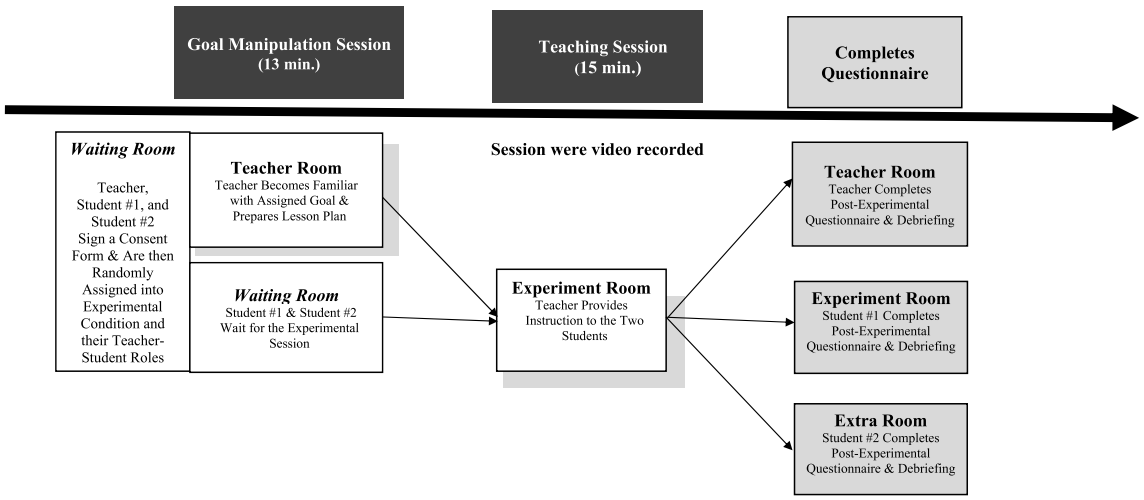


**Fig. 2.** Procedural timeline for the experiment in Study 1.

would like to do things"; $\alpha = 0.86$) for perceived autonomy support and the 4-item Controlling Teaching Questionnaire (CTQ; Jang, Reeve, Ryan, & Kim, 2009; "My teacher puts a lot of pressure on me"; $\alpha = 0.76$) for perceived teacher control.

To assess teachers' self-reported motivating style, teachers completed an adapted teacher version of both the LCQ and the CTQ (Reeve & Cheon, 2016). A sample item from the 6-item teacher version of the LCQ included, "I listened to how my students would like to do things" ($\alpha = 0.69$), while a sample item from the 4-item teacher version of the CTQ included, "I put a lot of pressure on my students" ($\alpha = 0.61$).

To assess objectively-scored teachers' motivating styles, two raters who were experts in self-determination theory and blind to experimental condition independently viewed the videotaped teaching-learning session. Rater 1 scored all 52 teachers to assess the dependent measures used in the data analyses, while Rater 2 scored the 22 teachers (42%) from the first week of data collection so that inter-rater reliabilities could be estimated. Raters used the "Observer's Rating Sheet" (Cheon et al., 2018) to score the six autonomy-supportive instructional behaviors of (1) takes the students' perspective, (2) vitalizes inner motivational resources, (3) uses informational language, (4) provides explanatory rationales, (5) acknowledges and accepts negative affect, and (6) displays patience, and to score the six controlling instructional behaviors of (1) takes only the teacher's perspective, (2) introduces extrinsic motivators, (3) uses pressuring language, (4) neglects explanatory rationales, (5) counters and tries to change negative affect, and (6) displays impatience. The internal consistency of the 6-ratings of autonomy support was $\alpha = 0.95$, and the internal consistency of the 6-ratings of teacher control was $\alpha = 0.96$. Inter-rater reliabilities were $r = 0.87$ for the overall autonomy-supportive style total score and $r = 0.84$ for the overall controlling style total score.

### 2.3. Data analyses

To test the effectiveness of the manipulation, planned comparison was applied to test for a mean difference between the combined intrinsic goal conditions and the control condition. To develop contrast codes, we coded the personal growth condition as "+1", the relationship growth condition as "+1", and the no-goal control condition as "-2". To estimate effect size information, we used Hedges' $g$ (i.e., corrected Cohen's $d$), which estimates corrected effect size when a pair of groups is compared with small and different sample (Fritz, Morris, & Richler, 2012).

To test the two hypotheses using the teacher- and rater-reports, we used the same planned comparison analysis with the same contrast codes used for the manipulation check. For the student-reports, we used multilevel data analyses because the students' data (Level 1, $N = 104$) were nested within teachers (Level 2, $k = 52$), using the HLM software (Bryk & Raudenbush, 2002). At level 1, we entered the students' gender as group mean centered covariate to function as statistical controls. At level 2, we entered experimental condition as an un-centered independent variable to retain its raw metric form (control group = −1, personal growth goal = +1, relationship growth goal = +1). To evaluate the hypothesis, we report the $t$-ratio that tested for the condition main effect along with its associated Hedges' $g$ effect size statistic.

### 2.4. Results

Missing values in the teacher, student, and rater data were rare (<0.1%) and were missing at random according to Little's MCAR test [$\chi^2$ ($df = 36$) = 35.93, $p = .472$]. To deal with these few missing data, we used the multiple imputation procedure using the expectation-maximization (EM) algorithm in SPSS25 (with 200 iterations).

#### 2.4.1. Manipulation check

Table 2 shows the means and standard deviations for teacher-reported intrinsic instructional goal usage during the teaching session broken down by experimental condition. Intrinsic instructional goal scores were higher for teacher-participants in the intrinsic instructional goal conditions than in the control condition (*Ms.* 5.43 vs. 4.74), $t(49) = 2.37$, $p = .022$, Hedges' $g = 0.68$.[1]

#### 2.4.2. Hypothesis tests

Table 3 shows the means and standard deviations for the autonomy-supportive and controlling motivating styles broken down by both experimental condition and type of informant (teacher, students, and

[1] Our manipulation check tested whether scores for teachers in any intrinsic instructional goal condition (personal growth or relationship growth) were significantly higher than scores for teachers in the no-goal control condition. To explore whether teachers' particular intrinsic instructional goal condition mattered, we conducted the three following post-hoc pairwise comparisons: personal growth goal vs. relationship growth goal, $t(49) = 0.30$, $p = .769$, Hedges $g = 0.12$; personal growth goal vs. no-goal control, $t(49) = 2.30$, $p = .026$, Hedges $g = 0.70$; and relationship growth goal vs. no-goal control, $t(49) = 1.89$, $p = .071$, Hedges $g = 0.63$. Collectively, what these exploratory post-hoc analyses show is that there is no difference between intrinsic instructional goal groups. For the individual comparison, teacher in personal growth group reported significantly higher than control group.

**Table 2**
*Means and Standard Deviations for Manipulations across Experimental Conditions Reported by Teacher in Study 1* (teacher $N = 52$).

| | Intrinsic Goal of Personal Growth ($N = 21$) | | Intrinsic Goal of Relationship Growth ($N = 15$) | | No-Goal Control ($N = 16$) | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Intrinsic Instructional Goal | 5.47 | .85 | 5.38 | .64 | 4.74 | 1.27 |

*Note.* Contrast code is coded intrinsic goal of personal growth condition as "+1"; Intrinsic goal of relationship growth condition as "+1"; No-goal control condition as "-2".

**Table 3**
*Means and Standard Deviations for Manipulations across Experimental Conditions Reported by Teacher, Student, & Rater* in study 1 ($N = 52$).

| | Intrinsic Goal of Personal Growth ($N = 16$) | | Intrinsic Goal of Relationship Growth ($N = 15$) | | No-Goal Control ($N = 16$) | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| *Autonomy Support* | | | | | | |
| Teacher | 5.17 | .84 | 4.69 | .56 | 4.31 | 1.08 |
| Student | 5.29 | .73 | 5.12 | .60 | 5.29 | .87 |
| Rater | 5.88 | 1.34 | 5.32 | .94 | 4.17 | 1.30 |
| *Teacher Control* | | | | | | |
| Teacher | 1.81 | .79 | 1.93 | .63 | 2.28 | .82 |
| Student | 1.32 | .26 | 1.41 | .46 | 1.33 | .29 |
| Rater | 2.97 | 1.49 | 2.47 | 1.35 | 3.91 | 1.33 |

*Note.* Contrast code is coded intrinsic goal of personal growth condition as "+1"; Intrinsic goal of relationship growth condition as "+1"; No-goal control condition as "-2". Student's score represents the mean score of two-students.

raters).[2]

**Autonomy-supportive motivating style.** For the teachers' scores, the autonomy-supportive style was significantly higher in the combined intrinsic instructional goal conditions than it was in the no-goal control group (*Ms,* 4.93 vs. 4.31), $t(49) = 2.38$, $p = .021$, Hedges' $g = 0.75$.[3] For the students' scores, the autonomy-supportive style was not significantly higher in the combined intrinsic instructional goal conditions than it was in the no-goal control group (*Ms,* 5.21 vs. 5.29), $t(50) = 0.30$, $p = .766$, Hedges' $g = 0.09$ (ICC = 0.31). For the raters' scores, the autonomy-supportive style was significantly higher in the combined intrinsic instructional goal conditions than it was in the no-goal control group (*Ms,* 5.60 vs. 4.17), $t(49) = 2.51$, $p = .015$, Hedges' $g = 0.74$.

**Controlling motivating style.** For the teachers' scores, the controlling style did not significantly differ by experimental condition (*Ms,* 1.87 vs. 2.28), $t(49) = 1.80$, $p = .078$, Hedges' $g = 0.56$.[4] For the students' scores, the controlling style did not significantly differ by experimental condition (*Ms,* 1.37 vs. 1.33), $t(50) = 0.35$, $p = .726$, Hedges' $g = 0.09$ (ICC = 0.01). For the raters' scores, the controlling style did significantly differ by experimental condition (*Ms,* 2.72 vs. 3.91), $t(49) = 2.80$, $p = .007$, Hedges' $g = 0.82$, as raters scored teachers in the two experimental conditions as significantly less controlling than they scored teachers in the control condition.

[2] Regarding the inter-correlations among the three informants (teacher, students, and rater), for the autonomy-supportive style, teacher-reports and student-reports were significantly correlated ($r = 0.30$, $p = .030$) while rater-reports were not significantly correlated with either teacher-reports ($r = 0.25$, $p = .079$) or student-reports ($r = 0.20$, $p = .166$). For the controlling style, scores from the three informants did not agree (i.e., were not significantly correlated); teachers and students ($r = 0.10$, $p = .486$); teachers and raters ($r = 0.12$, $p = .396$); raters and students ($r = -0.01$, $p = .973$).

[3] Hypothesis 1 tested whether scores for teachers in any intrinsic instructional goal condition (personal growth or relationship growth) were significantly higher than scores for teachers in the no-goal control condition. To explore whether teachers' particular intrinsic instructional goal condition mattered, we conducted the same three following post-hoc pairwise comparisons as conducted for the manipulation check. For teacher-reported scores, the findings were as follows: personal growth goal vs. relationship growth goal, $t(49) = 1.67$, $p = .102$, Hedges $g = 0.65$; personal growth goal vs. no-goal control, $t(49) = 3.02$, $p = .004$, Hedges $g = 0.90$; and relationship growth goal vs. no-goal control, $t(49) = 1.22$, $p = .229$, Hedges $g = 0.44$. For students-reported scores, the findings were as follows: personal growth goal vs. relationship growth goal, $t(49) = 0.70$, $p = .485$, Hedges $g = 0.25$; personal growth goal vs. no-goal control, $t(49) = 0.01$, $p = .992$, Hedges $g = 0.00$; and relationship growth goal vs. no-goal control, $t(49) = -0.65$, $p = .517$, Hedges $g = 0.25$. For rater-reported scores, the findings were as follows: personal growth goal vs. relationship growth goal, $t(49) = -1.05$, $p = .298$, Hedges $g = 0.47$; personal growth goal vs. no-goal control, $t(49) = 1.75$, $p = .087$, Hedges $g = 1.29$; and relationship growth goal vs. no-goal control, $t(49) = 2.60$, $p = .012$, Hedges $g = 1.01$. Collectively, what these exploratory post-hoc analyses show is that all three informants reported no difference between intrinsic instructional goal groups. For the individual comparison, teacher in personal growth group reported significantly higher perception on autonomy support than in control group, and rater reported teacher in relationship growth showed significantly higher autonomy support than in control group.

[4] Hypothesis 2 tested whether scores for teachers in any intrinsic instructional goal condition (personal growth or relationship growth) were significantly lower than scores for teachers in the no-goal control condition. To explore whether teachers' particular intrinsic instructional goal condition mattered, we conducted the same three following post-hoc pairwise comparisons as conducted for Hypothesis 1. For teacher-reported scores, the findings were as follows: personal growth goal vs. relationship growth goal, $t(49) = -0.48$, $p = .630$, Hedges $g = 0.16$; personal growth goal vs. no-goal control, $t(49) = -1.88$, $p = .066$, Hedges $g = 0.59$; and relationship growth goal vs. no-goal control, $t(49) = -1.28$, $p = .206$, Hedges $g = 0.48$. For students-reported scores, the findings were as follows: personal growth goal vs. relationship growth goal, $t(49) = -0.80$, $p = .435$, Hedges $g = 0.25$; personal growth goal vs. no-goal control, $t(49) = -0.08$, $p = .936$, Hedges $g = 0.04$; and relationship growth goal vs. no-goal control, $t(49) = 0.67$, $p = .509$, Hedges $g = 0.21$. For rater-reported scores, the findings were as follows: personal growth goal vs. relationship growth goal, $t(49) = 1.06$, $p = .295$, Hedges $g = 0.35$; personal growth goal vs. no-goal control, $t(49) = -2.01$, $p = .050$, Hedges $g = 0.66$; and relationship growth goal vs. no-goal control, $t(49) = -2.85$, $p = .006$, Hedges $g = 1.07$. Collectively, what these exploratory post-hoc analyses show is that all three informants reported no difference between intrinsic instructional goal groups. For the individual comparison, rater reported teacher in both relationship growth group and personal growth group showed significantly lower controlling than in control group.

### 2.5. Discussion

Study 1 tested both the malleability of the intrinsic instructional goal manipulation (i.e., the manipulation check) and its possible causal influence on teachers' motivating styles (i.e., the hypotheses tests). The manipulation of the intrinsic instructional goal was successful, as teachers assigned to pursue an intrinsic instructional goal conditions reported a higher intrinsic goal score than did teachers in the no-goal control condition. As to the effect of manipulated intrinsic instructional goal on the autonomy-supportive style, it did increase autonomy-supportive teaching according to the teachers and the raters but not according to the students.

As to the effect of manipulated intrinsic instructional goal on the controlling style, it did decrease controlling teaching according to the raters but not according to either the teachers or their students. This discrepancy might be because the CTQ (used by teachers and students) and the Observer's Rating Sheet (used by raters) assessed different aspects of the controlling style. The CTQ assessed teacher control as induced pressure, while the Rating Sheet assessed teacher control more broadly as engaging in objectively controlling instructional behaviors. The lack of correspondence among the measures of teacher control reported by the three informants can be seen by the non-significant correlations. Evidently, teacher adoption of an intrinsic instructional goal decreased some aspects of controlling teaching, but it did not decrease a pressured-imposing approach to instruction per se.

The discrepant results observed among the three informants in the brief laboratory teaching session in Study 1 was a finding that we needed to continue to investigate in Study 2's classroom context.

#### 2.5.1. Why study 1 did not include an extrinsic instructional goal manipulation

Our interpretation of the findings from the test of Hypothesis 1 was that the intrinsic instructional goal manipulation did generally increase autonomy-supportive teaching. One possible alternative interpretation, however, would be that any goal—intrinsic or extrinsic—might increase autonomy-supportive teaching, relative to a no-goal control condition. Because our Study 1 did not include an extrinsic instructional goal condition, this alternative interpretation cautions that we cannot be sure that it was an intrinsic instructional goal per se that explained the greater autonomy-supportive teaching.

Our decision to not include an extrinsic instructional goal condition reflected that status of the past research literature that had already and repeatedly employed a research design that included intrinsic, extrinsic, and no-goal instructional goal experimental manipulations (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004; Vansteenkiste, Simons, Lens, Soenens, & Matos, 2005; Vansteenkiste, Simons, Lens, Soenens, Matos, & Lacante, 2004; Vansteenkiste, Simons, Soenens, & Lens, 2004; Vansteenkiste, Timmermans, Lens, Soenens, & Van den Broeck, 2008). In all these studies, scores on measures of motivation, task persistence, conceptual or deep-level learning, and task performance were all significantly higher in the intrinsic goal condition than in the other two conditions. Further, in all but one of these studies (Vansteenkiste et al., 2004c), the extrinsic instructional goals produced negative effects on these dependent measures relative to the no-goal control condition. The conclusion was that extrinsic instructional goals produced either no benefits or only detrimental effects (and never positive benefits). Knowing this in advance, we had no need to include an extrinsic goal manipulation in our research design.

## 3. Study 2

Study 2 sought to expand the Study 1 laboratory context findings with college students as teachers to a more ecologically-valid classroom setting during a semester-long period with experienced teachers who delivered actual classroom lessons with ecologically-valid learning activities to their K-12 students. Its purpose was to investigate if the positive laboratory-based findings from Study 1 could be replicated and extended to the classroom-based school context with in-service teachers. However, Study 2 focused only on the autonomy-supportive motivating style (Hypothesis 1) because Study 1 generally observed null results for the controlling style (Hypothesis 2). Study 2 further sought to provide teachers with a stronger, more robust intrinsic instructional goal manipulation by providing participating teachers with a formal, theory-based, workshop-like experience to learn more about intrinsic instructional goals and how to pursue them during classroom instruction. In addition, The basic hypothesis driving the investigation was that teachers who adopt an intrinsic instructional goal would experience important teacher benefits. Study 1 focused on the teacher benefit of autonomy-supportive teaching, but we expanded our hypothesized teacher benefits in Study 2 to include teachers' need satisfaction (autonomy, competence, and relatedness) and teaching efficacy while teaching. We focused on these two additional teacher benefits because GCT's core prediction is that the pursuit of an intrinsic instructional goal affords the goal striver with multiple opportunities to experience need satisfaction (Kasser & Ryan, 1996; Niemiec et al., 2009; Vansteenkiste, Lens, & Deci, 2006). Thus, we expected teachers who participated in the intrinsic instructional goal intervention early in the semester would show a longitudinal increase over the course of the semester in their class-specific experiences of need satisfaction. We focused on increased teaching efficacy because it is such an important classroom benefit for teachers (Tschannen-Moran & Hoy, 2007) and because teacher adoption and pursuit of intrinsic instructional goals should change the classroom dynamics for the better. That is, an intrinsic instructional goal has been shown to increase students' adaptive classroom functioning (i.e., motivation, engagement, learning; Mouratidis et al., 2013 and as teachers notice the classroom dynamics changing for the better and their own role in those changes (via their pursuit of intrinsic instructional goals), their confidence that they can produce positive classroom effects, which is what teaching efficacy is (Tschannen-Moran & Hoy, 2007), should longitudinally increase over the course of the semester.

Study 2 tested three hypotheses. *Hypothesis 1* was that teachers in the intrinsic instructional goal intervention group, compared to teachers in the no-intervention control group, would report longitudinal enhancement of the autonomy-supportive motivating style. *Hypothesis 2* was that teachers in the intrinsic instructional goal intervention group, compared to teachers in the no-intervention control group, would report longitudinal enhancement of their teaching-related needs satisfaction. *Hypothesis 3* was that teachers in the intrinsic instructional goal intervention group, compared to teachers in the no intervention control group, would report longitudinal enhancement of their teaching efficacy.

### 3.1. Method

#### 3.1.1. Participants

*Teacher-participants* were the full faculty population at a K-12 school in Bulacan, Philippines that included 26 full-time K-12 ethnic Filipino teachers (7 males, 19 females). Thirteen teachers taught at the elementary grade level (grade 1 to grade 6), nine teachers taught at the junior high level (grade 7 to grade 10), and four teachers taught at the senior high level (grade 11 to grade 12). Collectively, these teachers taught 10 different subjects (class size $M = 16.6$, range = 9 to 23) including Filipino, English, Math, Science, Social Studies, Home economics, PE, Art, History, and Music. Teachers averaged 32.9 years of age (*range* = 19 to 54) and 8.8 years of teaching experience (*range* = 1 to 28). By working with an entire school faculty, our study gained a huge advantage in terms of its potential external generalizability (i.e., the sample of teachers was actually a population, rather than a sample from that population that may introduce self-selection biases during teacher recruitment).

*Student-participants* were 538 students (260 males, 260 females, and 18 unknown) in grades 4 through 12 who were in the classes of the

teacher-participants on the day the student questionnaire was first administered. Questionnaire data were collected only from the students in grades 4 through 12. Questionnaire data were not collected in the classes with students in grades 1 through 3 because such data were expected to be both unreliable and especially time-consuming to collect. Student-participants therefore consisted of 155 elementary, 330 junior high, and 53 senior high students. Average age across all students was 13.2 years old ($SD = 2.4$).

Prior to the field experiment, we considered the teacher and student sample sizes needed to adequately power our statistical analyses. For the teacher data, the minimal sample size of teachers needed for a 2-group, repeated-measures ANCOVA using conventional statistics (*alpha* = 0.05, *power* = 0.90) and equal *N*s in the experimental and control groups to detect a large effect ($f = 0.44$, based on Jang (2019)) and Faul et al. (2007) G*Power 3 software was 44, which suggested that our hypothesis tests using the teacher data was under-powered. For the rater data, the minimal sample size of teachers needed for a 2-group independent *t*-test using conventional statistics (*alpha* = 0.05, *power* = 0.90) and equal *N*s in the experimental and control groups to detect a large effect ($d = 1.50$, based on Cheon, Reeve, & Ntoumanis, 2019) and Faul et al. (2007) G*Power 3 software was 22, which suggested that our hypothesis test using the rater data was adequately powered. For the student data, we tested our hypotheses using a 3-level hierarchical model analysis. To evaluate the adequacy of our sample combination ($k = 26$ teachers, $n = 505$ students), for a two-group repeated measures that used a three-level model, $k = 30$ teachers is recommended (Moeyaert, Ugille, Ferron, Beretvas, & den Noortgate, 2014), which suggested that our hypothesis test using the student data with $k = 26$ teachers was somewhat under-powered.

### 3.1.2. Procedure

The present research was approved by the Institutional Review Board of the first author's university. One month prior to the 2nd quarter of the academic year, the research team met with the school director to gain consent for the experimental longitudinal study. Following this consent, the research team recruited the full population of 26 teachers to participate in the study. All 26 teachers agreed to participate. Each teacher was then randomly assigned into either the experimental (14 teachers and their 267 students) or control (12 teachers and their 271 teachers) group.

The procedural timeline for the intrinsic instructional goal intervention and the 2 waves of data collection appears in Fig. 3. The Philippines school year consists of 4 quarters with 8–9 weeks in each quarter. The present study took place during the 2nd quarter of the academic year. At Time 1 (week 2 of the 2nd quarter), teachers and their students in both the experimental and control groups completed the questionnaire package. Teachers and students were assured that their responses were confidential and used only for research purposes. After finishing the first wave of data collection, teachers in the experimental group participated in the Intrinsic Instructional Goal Intervention Program (IIGI), while teachers in control group taught their classes using their existing instructional goals ("practice as usual"). At Time 2 (week 7 of the 2nd quarter), teachers and their students completed the study questionnaire for a second time. For raters' class observations, two raters observed 10–15 min of one class period of each teacher during week 6 of the 2nd quarter.

### 3.1.3. Intrinsic instructional goal intervention (IIGI)

The IIGI was created for the purposes of the present investigation, and it was presented to teachers in the experimental condition in two parts. Part 1 was knowledge-based ("what to do") to introduce the concept of an intrinsic instructional goal and to identify the evidence-based benefits of adopting intrinsic instructional goals. Part 2 was skill-based ("How to do it") to help teachers develop the skill they needed to introduce an intrinsic goal during instruction in their own classroom with their own students. Part 1 and Part 2 both took place during week 3 of the second quarter (see Fig. 3).

Part 1 began with activities and a group discussion to help teachers reflect on their current instructional goals. After the goal reflection, a PowerPoint (PPT) presentation introduced the instructional goals concept. It defined an intrinsic instructional goal, and it then provided several examples of intrinsic instructional goals to pursue (a) students' personal growth, including "Help students become the person they want to become" and "Invite students to learn new things" and (b) students' relationship growth, including "Encourage a close relationships between classmates" and "Get to know each other better". To conclude Part 1, the PPT presented empirical evidence of the student benefits of teachers' introducing and pursuing intrinsic instructional goals.

Part 2 was a workshop to help teachers learn how to translate intrinsic instructional goals into classroom instruction. Teachers were provided with concrete examples of how to introduce student-focused personal growth and relationship growth goals into the delivery of their classroom instruction. For instance, to promote students' personal growth, teachers learned how first to introduce the goal (e.g., announce the goal verbally or write it on the blackboard at the beginning of a learning activity) and second structure the learning activity to help students attain that goal [e.g., work in a small group setting or provide constructive feedback to a classmate (for relationship goals), write down their interests, wished-for skills, or personal goals related to the subject matter to talk about during a teacher-student class discussion (for personal growth goals)].

## 3.2. Measures

Dependent measures were collected from three informants: teacher-report, student-report, and observers' rating. All scales used a 7-point

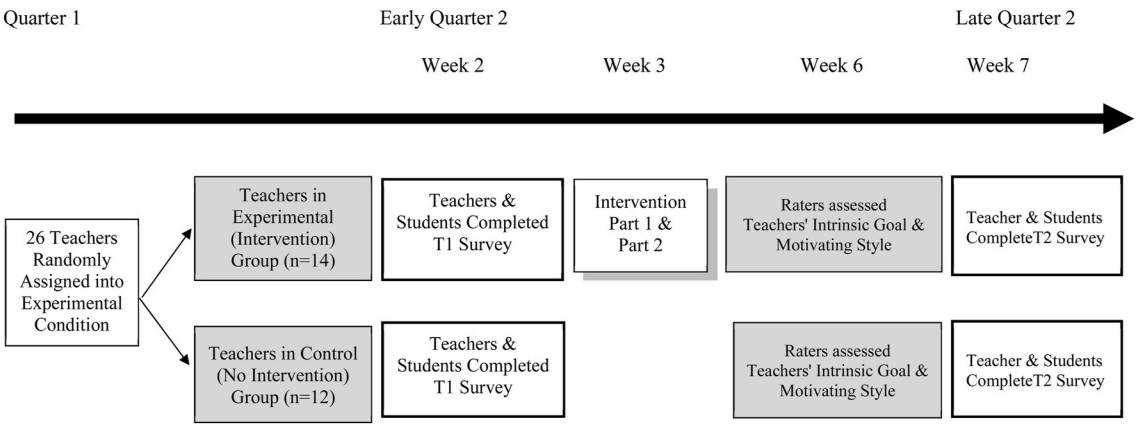


**Fig. 3.** Procedural timeline for the 2-part intrinsic instructional goal intervention and the 2 waves of data collection in Study 2. T1 = Time 1; T2 = Time 2.

bipolar response scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*), except for the Teacher Goal Questionnaire that used a unipolar response scale (1 = *Not at All Important*; 7 = *Very Important*) and the Teachers' Sense of Efficacy Scale (TSES) that used a 9-point unipolar response scale (1 = *Nothing;* 9 = *A Great Deal*), as recommended by the developers of the TSES (Tschannen-Moran & Hoy, 2001).

***Manipulation Checks.*** To assess the effectiveness of intervention treatment, we used two dependent measures (i.e., teachers' self-report and raters' class observation). First, to assess the teachers' perceived intrinsic instructional goal, teachers completed the same 8-item intrinsic instructional goal scale from the Teacher Goal Questionnaire (Jang, 2019) used in Study 1. Internal consistency of 8-item intrinsic instructional goal measure was adequate: α = 0.80 (T1) and α = 0.78 (T2). Second, to assess raters' observational scores of teachers' intrinsic instructional goal, the instructional goal rating sheet featured two items to assess the extent to which the teacher pursued their students' personal growth (item 1) and relationship growth (item 2). Rater 1 scores were used in the data analysis, while Rater 2 scores were used to estimate the inter-rater reliabilities. The internal consistency of the two items from the rating sheet was $\alpha = 0.89$, and the two raters' inter-rater reliability on the overall 2-item score was $r = 0.84$.

***Autonomy-Supportive Style.*** To assess the autonomy-supportive style, we used three types of measures (i.e., teacher-report, student-report, and observers' rating). First, to assess teachers' self-reported autonomy-supportive teaching, teachers completed the same adapted teacher version of LCQ used in Study 1 (from Reeve & Cheon, 2016). The internal consistency of the 6-item autonomy-supportive style measure was adequate: α = 0.87 (T1) and α = 0.78 (T2).

Second, to assess students' perceived autonomy-supportive teaching, students completed the same Learning Climate Questionnaire (LCQ, Williams & Deci, 1996) used in Study 1. The internal consistency of the 6-item autonomy-supportive teaching measure was adequate: α = 0.86 (T1) and α = 0.89 (T2).

Third, raters' assessed teachers' in-class reliance on autonomy-supportive teaching by using the same 6-item "Observer's Rating Sheet" scale used in Study 1 from Cheon et al., 2018. Rater 1 scores were used in the data analysis, while Rater 2 scores were used to estimate inter-rater reliabilities. The internal consistency of the six items from the rating sheet was $\alpha = 0.87$, and the two raters' inter-rater reliability on the overall 6-item score was $r = 0.72$.

***Need Satisfaction.*** To assess psychological needs satisfaction during teaching, teachers completed the Basic Psychological Needs Satisfaction and Frustration questionnaire (BPNSF; Chen et al., 2015) that was slightly adapted by adding "while teaching" to each item. The BPNSF assesses three aspects of basic psychological needs satisfaction: autonomy satisfaction (e.g., "I feel a sense of choice and freedom in the things I undertake while teaching"); competence satisfaction (e.g., "I feel confident that I can do things well while teaching"); and relatedness satisfaction (e.g., "I feel connected with people who care for me, and for whom I care while teaching"). The internal consistency of the 12-item needs satisfaction measure was adequate: α = 0.87 (T1) and α = 0.85 (T2).

***Teaching Efficacy.*** To assess teaching efficacy, teachers completed the 12-item Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran & Woolfolk Hoy, 2001). The TSES assesses three aspects of teaching efficacy: teaching efficacy for instructional strategies (e.g., "How much can you do to provide an alternative explanation when students are confused?"), teaching efficacy for student engagement ("How much can you do to motivate students who show low interest in school work?"), and teaching efficacy for classroom management ("How much can you do to calm a student who is disruptive or noisy?"). Internal consistency of the 12-item TSES was adequate: $\alpha = 0.95$ (T1) and $\alpha = 0.94$ (T2). The TSES has been successfully used in previous research (Wolters & Daugherty, 2007).

***Intervention Fidelity.*** To asses intervention fidelity, both an intervention fidelity scale and an open-ended question adapted from previous intervention studies were used (Cheon & Reeve, 2015; Mellalieu, Hanton, & Thomas, 2009). The intervention fidelity scale asked four-items relating to teachers' satisfaction with the intrinsic instructional goal intervention (IIGI) experience in terms of acceptance, importance, satisfaction, and usefulness: (1) "Do you agree that your participation in the Intrinsic Instructional Goal Intervention Program improved your classroom instructional goals?" (2) "Was your participation in the Intrinsic Instructional Goal Intervention Program important to you?" (3) "How satisfied with the Intrinsic Instructional Goal Intervention Program were you?" (4) "Was the Intrinsic Instructional Goal Intervention Program useful to you?". The open-ended question asked, "Overall, were you satisfied with the Intrinsic Instructional Goal Intervention Program experience? If so, Why? If not, why not?". Only teachers who participated in IIGI completed intervention fidelity questionnaire.

### 3.3. Data analyses

Three types of data analyses were used. For the teacher-reported dependent measures, a pair of 2 (experimental condition) × 2 (time waves) repeated-measures ANCOVAs were used. Condition (control 0, experiment 1) was the between-subject independent variable and time (time 1, time 2) was the within-subject repeated measures independent variable. Grade level and teacher gender were controlled for in all teacher-reported analyses. For the rater-scored dependent measures, an ANCOVA was used because data were collected at only one time point (Time 2) and to control for the same 2 covariates (i.e., grade level, gender). For the student-reported dependent measures, hierarchical linear model analysis was applied, because the student data featured repeated measures (Level 1) nested within students (Level 2) nested within teachers (Level 3). Student grade level and gender were controlled for in all student-reported analyses.

To estimate the effect size from the repeated measures analyses (i.e., teachers and students), we used independent-groups pretest-posttest design test ($d_{\text{IGPP\_RAW}}$), which is recommended for intervention-based repeated-measures experimental research designs (Feingold, 2009). It contrasts the changed mean score in the dependent variable observed in the intervention group vs. the changed mean score observed in the control group. The calculation formula is as follows:

$$d_{\text{IGPP\_RAW}} = \left(M_{\text{CHANGE-T, T2-T1}} / \text{SD}_{\text{RAW-T at T1}}\right) - \left(M_{\text{CHANGE-C, T2-T1}} / \text{SD}_{\text{RAW-C at T1}}\right)$$

To estimate the effect size from the one-time rater scores, we used partial eta square ($\eta_p^2$) that estimates the variance in the dependent measure accounted for by the independent variable.

**Table 4**
*Means and Standard Deviations for Teacher, Student, and Rater Dependent Measures Broken Down by Experimental Condition and Time of Assessment* (study 2).

| Dependent Measures | Intervention Group | | | | Control Group | | | |
|---|---|---|---|---|---|---|---|---|
| | Time 1 | | Time 2 | | Time 1 | | Time 2 | |
| | M | SD | M | SD | M | SD | M | SD |
| *Intrinsic Goal Manipulation* | | | | | | | | |
| Teacher | 6.12 | .62 | 6.41 | .94 | 6.01 | .63 | 5.47 | .95 |
| Rater | | | 5.05 | 1.16 | | | 3.69 | 1.16 |
| *Autonomy Support* | | | | | | | | |
| Teacher | 5.53 | .74 | 5.90 | .86 | 5.35 | .74 | 4.56 | .87 |
| Student | 4.52 | .29 | 4.70 | .30 | 4.78 | .27 | 4.90 | .28 |
| Rater | | | 5.15 | 1.04 | | | 3.99 | 1.04 |
| *Needs satisfaction* | 5.05 | .83 | 5.54 | 1.12 | 5.44 | .83 | 4.32 | 1.13 |
| *Teaching Efficacy* | 6.63 | .92 | 7.11 | 1.44 | 6.79 | .92 | 5.47 | 1.45 |

Note. Teacher N = 26, Students N = 538.

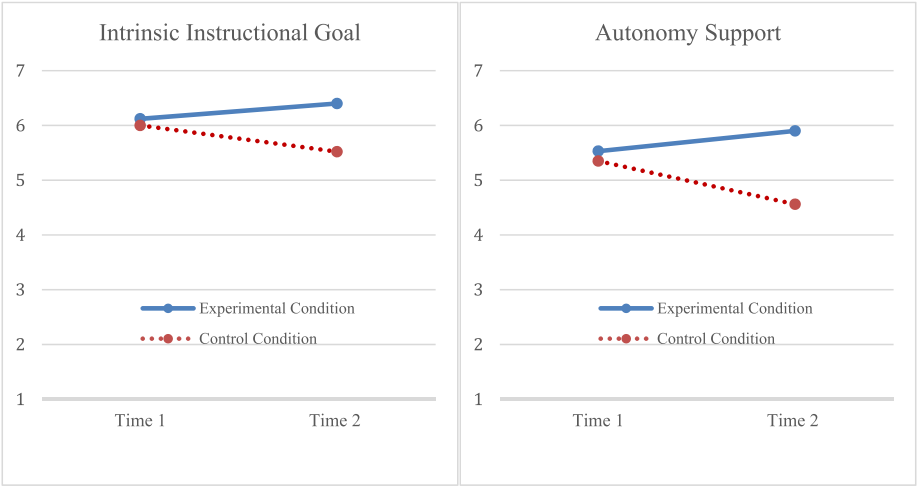


**Fig. 4.** Teacher-reported measures of intrinsic instructional goal and autonomy-support broken down by experimental condition and time of assessment (Study 2). Solid lines represent the experimental condition, while dashed lines represent the control condition.

### 3.4. Results

#### 3.4.1. Preliminary analyses

Complete data were obtained from 24 of original 26 teachers (retention rate = 92%) and 505 of their original 538 students (retention rate = 94%). Skewness and kurtosis values were all less than |1.34| indicating little deviation from normality (Curran, West, & Finch, 1996). The two teachers who did not complete the study were both in the control group, and the reason they did not complete the study was because they were away on a school trip during the T2 data collection. The 2 teachers and 33 students who did not completed the T2 survey did not differ significantly on any T1 dependent measure from the teachers and students who completed the survey at both T1 and T2. Overall, missing data were 5.8%. To the handle the missing data, Little's MCAR test was first conducted. Results showed that the missing data were missing at random [ $\chi^2$ (6169) = 619.01, $p$ = .999]. To deal with the missing data from the 24 teachers and their 505 students and the missing cases of the 2 teachers and their 33 students, we used the multiple imputation procedure using the expectation-maximization (EM) algorithm in SPSS25 (with 200 iterations).

#### 3.4.2. Two manipulation checks

Table 4 shows the means and standard deviations for the two T2 manipulation checks (teacher-reported, rater-scored) broken down by experimental condition and time of assessment.[5]

***Teacher-reported intrinsic instructional goal.*** The critical condition × time interaction was significant for teacher-reported intrinsic instructional goal, $F(1,22) = 5.07$, $p = .035$, $d_{IGPP\_RAW} = 1.36$. As shown in the left panel of Fig. 4, teacher-reported intrinsic instructional goals in the intervention group were stable from T1 to T2 ($\Delta = +0.29$, $t = 1.38$, $p = .181$), while they decreased significantly for the teachers in the control group from T1 to T2 ($\Delta = -0.54$, $t = 2.35$, $p = .028$).

***Rater-scored intrinsic instructional goal.*** The condition main effect was significant for rater-scored intrinsic instructional goal, $F(1, 22) = 8.43$, $p = .008$, $\eta_p^2 = 0.28$. Raters scored teachers in the intervention group higher on intrinsic instructional goal than they scored teachers in the control group (*Ms.* 5.05 vs 3.69).

#### 3.4.3. Hypothesis tests

Table 4 shows the means and standard deviations for the autonomy-supportive motivating style, need satisfaction, and teaching efficacy dependent measures broken down by informant, experimental condition, and time of assessment.

[5] The two manipulation check measures were positively correlated ($r = 0.25$, $p < .001$).

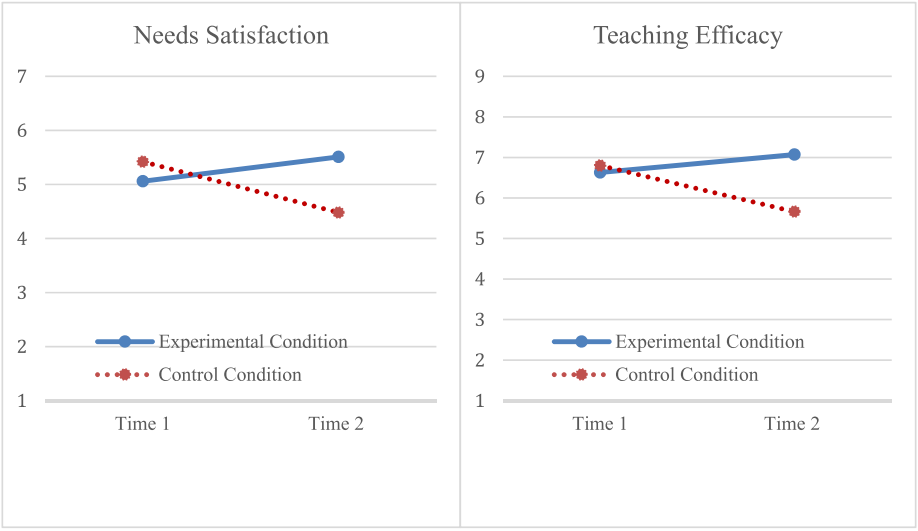


**Fig. 5.** Teacher-reported measures of needs satisfaction and teaching efficacy broken down by experimental condition and time of assessment (Study 2). Solid lines represent the experimental condition, while dashed lines represents the control condition.

**Autonomy-Supportive Teaching (H1).**[6] For the teachers' scores, the critical condition × time interaction was significant, $F(1, 22) = 5.12$, $p = .034$, $d_{IGPP\_RAW} = 1.04$. As shown in the right panel of Fig. 4, autonomy support scores for teachers in the intervention group were stable from T1 to T2 ($\Delta = +0.22$, $t = 1.24$, $p = .228$), while autonomy support scores for teachers in the control group significantly decreased from T1 to T2 ($\Delta = -0.45$, $t = 2.53$, $p = .019$). For the students' scores, the critical condition × time interaction was not significant, $t(486) = 0.62$, $p = .536$, $d_{IGPP\_RAW} = 0.18$ (ICC = 0.65). For the raters' scores, the condition main effect was significant $F(1, 22) = 7.50$, $p = .012$, $\eta_p^2 = 0.25$). Raters scored teachers in intervention group significantly higher on autonomy-supportive teaching than they scored teachers in control group (*Ms*. 5.15 vs 3.99).

**Need Satisfaction (H2).** For teachers' needs satisfaction, the critical condition × time interaction was significant, $F(1, 22) = 5.85$, $p = .024$, $d_{IGPP\_RAW} = 1.94$. As shown in the left panel of Fig. 5, needs satisfaction for teachers in the intervention group was stable from T1 to T2 ($\Delta = +0.49$, $t = 1.88$, $p = .073$), while it decreased significantly for teachers in control group from T1 to T2 ($\Delta = -1.12$, $t = 3.96$, $p < .001$).

**Teaching Efficacy (H3).** For teaching efficacy, the critical condition × time interaction was significant, $F(1, 22) = 6.78$, $p = .016$, $d_{IGPP\_RAW} = 1.95$. As shown in the right panel of Fig. 5, teaching efficacy for teachers in the intervention group was stable from T1 to T2 ($\Delta = +0.48$, $t = 1.52$, $p = .143$), while it decreased significantly for teachers in the control group ($\Delta = -1.32$, $t = 3.84$, $p < .001$).

#### 3.4.4. Intervention fidelity

Teachers who participated in the IIGI ($n = 14$) reported overall high satisfaction with the intervention experience on the overall 4-item scale, $M = 6.40$, $SD = 0.60$. More specifically, these 14 teachers rated (using a 1–7 response scale) the IIGI intervention with high acceptance ($M = 6.47$, $SD = 0.64$), importance ($M = 6.40$, $SD = 0.63$), satisfaction ($M = 6.27$ $SD = 0.70$), and usefulness ($M = 6.47$, $SD = 0.64$). Teachers consistently positive responses on the open-ended survey question are available from the first author upon request.

[6] Regarding the inter-correlations among the three informants (teacher, students, and raters) for the autonomy-supportive style, measures of $T^2$ teacher-reports and T2 rater-reports were significantly correlated ($r = 0.36$, $p < .00^1$), while student-reports were not significantly correlated with either teacher-reports ($r = -0.06$, $p = .158$) or rater-reports ($r = -0.05$, $p = .232$).

### 3.5. Discussion

Study 2 conducted the first-ever intrinsic instructional goal intervention and demonstrated that the intrinsic instructional goal was malleable in a natural classroom setting. Teachers in the intervention group reported very high acceptance, importance, satisfaction, and utility of their IIGI intervention experience. These same teachers reported a higher Time 2 intrinsic instructional goal score than did teachers in the control group. Further, teacher participation in the intervention reproduced the same facilitating effect of intrinsic instructional goals on autonomy-supportive teaching as observed in Study 1, at least according to both teachers' self-reports and raters' objective observations. Students, however, did not show this same facilitating effect. Study 2 also demonstrated the new findings that manipulated intrinsic instructional goal enhanced teachers' experiences of needs satisfaction and teaching efficacy. Overall Study 2, which was conducted in the more ecologically-valid setting with experienced teachers delivering actual and ecologically-valid lessons, replicated and extended the laboratory-based Study 1 findings.

## 4. General discussion

The purpose of the present investigation was to test causal facilitating effect of teachers' intrinsic instructional goal on the autonomy-supportive motivating style. Before testing the causal effect, it was necessary to test that the intrinsic instructional goal was malleable. In Study 1, we manipulated individual instructional goals by providing a booklet that simply identified the instructional goal to be pursued during the teaching session; in Study 2, we manipulated intrinsic instructional goal by providing an extensive workshop experience. The results showed that teachers were able to adopt more intrinsic instructional goals accordingly. The effect size from the instructional booklet manipulation in Study 1 was moderate-to-large (Hedges' $g = 0.68$), while it was notably larger when using the IIGI in Study 2 ($d_{IGPP\_RAW} = 1.36$). Evidently, exposure to a full-day workshop on how to adopt and practice intrinsic instructional goals allows teachers to pursue intrinsic instructional goals to a greater extent than does exposure to a brief instructional booklet.

### 4.1. The causal, facilitating effect of intrinsic instructional goals on autonomy-supportive teaching

During the IIGI, teachers learned how to take an existing lesson plan

and frame its instructional goals (i.e., learning objectives) into intrinsic instructional goals. The adopting and integrating of the intrinsic instructional goal mainly occur during the pre-lesson phase (preparation and reflection). Once teachers create and plan their lesson and identify the instructional goal to be pursued, teachers need to take a second step to actually pursue that intrinsic instructional goal and they do this through their in-class instructional behaviors. These instructional behaviors can be regarded as a behavioral strategy to attain the aspired instructional goal, and in the case of intrinsic instructional goals that instructional behavior tends toward autonomy-supportive teaching.

According to both objective raters and teachers themselves, teachers who adopted an intrinsic instructional goal also adopted a more autonomy-supportive motivating style. These same teachers did not, however, come across as more autonomy supportive according to their students. We interpret this pattern of findings as showing that teachers who adopted an intrinsic instructional goal did orient themselves toward greater autonomy-supportive teaching, but they were not able to offer it in a way that either produced a meaningful benefit to their students or was obviously more pronounced (noticeable) than what students had come to see as their teacher's habitual teaching style. What this means is that the adoption of an intrinsic instructional goal gives teachers a tendency, orientation, or readiness toward autonomy-supportive teaching, but it does not cause full-blown autonomy-supportive teaching. To become truly or fully autonomy supportive [i.e., in the eyes (and experience) of students], teachers need a bit more of a professional developmental experience, such as participation in an autonomy-supportive teaching intervention (ASTI; Cheon et al., 2018).

Table 5 identifies the key distinctions between an intrinsic instructional goal intervention (IIGI) and an autonomy-supportive teaching intervention (ASTI). The information in Table 5 serves two purposes. First, the information provided in the middle and rightmost columns identify the key elements in both an IIGI and an ASIP. That is, during Part 1 of the IIGI intervention, teachers learn what intrinsic instructional goals are and observe and become familiar with multiple examples of these goals applied to classroom instruction. During Part 1 of an ASTI, teachers learn what autonomy-supportive teaching is and observe and become familiar with multiple examples of these acts of instruction applied to classroom instruction. During Part 2 of an IIGI intervention, teachers learn how to put intrinsic instructional goals into practice, as by introducing the goal and then structuring the upcoming learning activity in a way that helps students attain the sought-after goal. During Part 2 of an ASTI, teachers learn how to enact autonomy-supportive instructional behaviors, including the seven listed in Table 5 (e.g., acknowledge and accept negative feelings). A comparison of the key features of the two interventions shows clearly how the two interventions are different from one another, but an integration of the information in Table 5 with the earlier presented Fig. 1 suggests how the skill learned during an IIGI would ready the teacher to benefit from the skills learned during an ASTI. Second, the information provided in Table 5 provides a possible template for a future research study that might provide participating teachers with both an IIGI and an ASTI. We suspect that such a merged intervention experience would allow teachers to provide autonomy-supportive teaching that their students would both perceive and benefit from.

### 4.2. Did intrinsic instructional goal actually increase autonomy-supportive teaching?

The findings in both Study 1 (Table 3) and Study 2 (Table 4) clearly showed that the adoption of an intrinsic instructional goal increased autonomy-supportive teaching. The results in Study 2 (Fig. 3), however, showed a pattern of findings in which teachers in the no-intervention control group showed a significant decrease in autonomy-supportive teaching. So, in Study 2, it was not so much that intrinsic instructional goal adoption increased autonomy-supportive teaching as it was that intrinsic instructional goal adoption buffered teachers against an otherwise end-of-semester decline that naturally occurs in these classrooms as the pressures of the semesters steadily accumulate (e.g., cover the full course material, high-stakes testing, and external evaluations of the teacher from parents, students, and the principal).

### 4.3. Gains in need satisfaction and teaching efficacy

IIGI participation benefited teachers in terms of their psychological need satisfaction and teaching efficacy. The observed gains in teachers' needs satisfaction are important because SDT emphasizes that needs satisfaction leads to teachers' more positive functioning and well-being. For instance, pursuing the goal to help others (i.e., intrinsic goal) tends

**Table 5**
Key distinctions between an intrinsic instructional goal intervention and an autonomy-supportive teaching intervention.

| | Intrinsic Instructional Goal Intervention | Autonomy-Supportive Teaching Intervention |
|---|---|---|
| **Part 1: What It Is** | | |
| Provide Definitions, Examples, Sample Scripts, and Video Models of Each Recommended Act of Instruction | An instructional goal is what the teacher aspires to attain during the lesson. An *intrinsic instructional goal* is to aspire to have students experience an episode of either personal growth or relationship growth during the lesson. | *Autonomy-supportive teaching* is the adoption of a basic student-focused attitude and an interpersonal tone of understanding that enables the skilful enactment of seven autonomy need satisfying instructional behaviors (listed below). |
| **Part 2: How to Do It** | | |
| Provide Teacher-Participants with the Step-by-Step Guidance, Mentoring, Feedback, and Opportunities for Deliberate Practice They Need to Build the Recommended Teaching Skill | *Provide a Personal Growth Goal*<br>a) Teacher introduces the goal to students (e.g., "Learn something new").<br>b) Teacher structures the learning activity to help students pursue the attainment of that goal (e.g., Teacher asks students to identify 3 new, personally-valued vocabulary words to have translated in a foreign language class).<br><br>*Provide a Relationship Growth Goal*<br>a) Teacher introduces the goal to students (e.g., "Get to know your classmate better.")<br>b) Teacher structures the learning activity to help students pursue the attainment of that goal [e.g., Teacher puts students into pairs and gives each student an opportunity to help the other (e.g., provide constructive feedback on the other's essay)]. | *Take the Students' Perspective* (e.g., conduct a formative assessment to understand students' preferences).<br><br>*Create Opportunities for Students to Pursue Their Interests*<br><br>*Present Learning Activities in Autonomy-Satisfying Ways* (e.g., offer choice).<br><br>*Provide Explanatory Rationales* (e.g., explain why a teacher-requested activity can be personally useful).<br><br>*Acknowledge and Accept Negative Feelings* (e.g., when students complain, say: "I understand; yes, I can see why you feel that way; what can we do that would help?")<br><br>*Rely on Invitational Language* (e.g., when making an engagement request, say, "You may want to…")<br><br>*Display Patience* |

to enhance helpers' needs satisfaction, vitality and well-being (Martela & Ryan, 2016). Gains in need satisfaction also confirm the basic tenet of GCT—namely, that the pursuit of an intrinsic goal opens up the goal-striver to frequent and recurring opportunities to experience need satisfaction. The observed gains in teaching efficacy are important because these gains have been shown to produce meaning benefits to both teachers (e.g., greater job satisfaction; Caprara, Barbaranelli, Borgogni, & Steca, 2003) and their students (e.g., greater engagement; Guskey, 1984; Nathaniel, Sandilos, Pendergast, & Mankin, 2016). Our interpretation of why this positive effect of the intervention on teaching efficacy occurred was because teachers who adopt and pursue intrinsic instructional goals change the classroom dynamics for the better, and as teachers become aware that their acts of instruction are responsible for those desired changes their teaching efficacy rises proportionally. These gains showed that once teachers adopt intrinsic instructional goal, they experience energy boosting satisfaction (i.e., needs satisfaction and teaching efficacy) rather than energy draining (i.e., feeling burden and burn out). Given that both personal growth goal and relationship growth goal energize to inwardly-oriented pathway that affords positive benefits, pursuing two intrinsic instructional goal would give recurring benefits as much as implementing them to class instruction. It is also evidenced that teachers reported high satisfaction for IIGI in term of acceptance, importance, satisfaction, and usefulness.

## 5. Limitations and future research

Teachers who strived for intrinsic instructional goals showed several benefits, but some concerns also emerged. First, as discussed, multiple informants (i.e., teacher, student, and rater) did not agree on all their ratings. Such non-convergence has been observed in previous research, presumably because different informants attend to and value different aspects of what teachers say, do, and prioritize during instruction (Aelterman, Vansteenkiste, Van den Berghe, De Meyer, & Haerens, 2014; Haerens et al., 2013). Second, the adoption of an intrinsic instructional goal increased autonomy-supportive teaching, but it did not decrease controlling teaching. Such a result supports the ideas that autonomy support and teacher control (1) are two largely interdependent (rather than opposite) dimensions of a teacher's classroom motivating style and (2) have unique antecedents (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011). Third, because teachers in Study 2 were all from the same school, it is possible that a cross-condition contamination effect might have occurred in which teachers in the experimental group discussed what they learned during the IIG intervention with teachers in the control group. This possible limitation is not problematic in the interpretation of the Study 2 findings, however, because any such contamination that might have occurred would have reduced the observed effect sizes and simply rendered the observed results conservative. Fourth, a demand effect is possible because teachers knew that they were in professional development program (i.e., a Hawthorne effect —the tendency for participants in an experiment to work harder and to perform better merely because of the extra attention paid to them by the researchers, McCarney et al., 2007). We limited this possible limitation by concealing from teachers what the study independent and dependent measures were. Still, a research design that included an active control group that participated in an alternative intervention/professional workshop is needed to rule out such a possible demand effect (e.g., see Chatzisarantis & Hagger, 2009). Finally, although the present research showed the essential benefits of intrinsic instructional goal, but the long-term sustainability of a changed intrinsic instructional goal was not investigated and leaves open the question of the endurance of the observed benefits.

## 6. Conclusion

Teachers' intrinsic instructional goals were malleable, as from information provided in a test booklet and from participation in the IIGI. When teachers adopted and pursued an intrinsic instructional goal, they taught in a more autonomy-supportive way. They also experienced greater need satisfaction and teaching efficacy while doing so. Recognizing these benefits, we suggest that the exploration of the benefits of adopting intrinsic instructional goals is a promising new area of both future research and improved classroom practice.

## CRediT authorship contribution statement

**Hye-Ryen Jang:** Conceptualization, Methodology, Investigation, Formal analysis, Writing - original draft, Writing - review & editing. **Johnmarshall Reeve:** Methodology, Writing - review & editing.

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