



# Teachers' engaging messages and the relationship with students' performance and teachers' enthusiasm

Samuel Falcon<sup>a</sup>, Wilfried Admiraal<sup>b</sup>, Jaime Leon<sup>a,\*</sup>

<sup>a</sup> University of Las Palmas de Gran Canaria, Department of Education, Juan de Quesada, N° 30, Zip: 35001, Las Palmas de Gran Canaria, Las Palmas, Spain

<sup>b</sup> Oslo Metropolitan University, Centre for the Study of Professions, Pilestredet 40, 0167, Oslo, Norway

## ARTICLE INFO

### Keywords:

Teaching  
Secondary education  
Speech education  
Communication education  
Message codification

## ABSTRACT

The current study examined the relation of students' performance and teachers' enthusiasm with teachers' use of engaging messages in class. These messages can focus on the benefits or disadvantages of engaging in a school task, and appeal to controlled (i.e., extrinsic, or introjected) or autonomous (i.e., identified, or intrinsic) incentives to engage students. Engaging messages were gathered through audio-recorded lessons of 39 teachers in 59 student groups during the second term of the academic year. Results showed that both students' performance and teachers' enthusiasm are related to teacher's use of engaging messages. The better the students' performance, and the higher the teachers' enthusiasm, the larger the number of messages used. Moreover, the better the students' performance, the greater the likelihood of using messages that appeal to extrinsic incentives. By assessing engaging messages through objective observations, we discovered relationships that can help us better understand teachers' use of engaging message.

## 1. Introduction

Teachers and students' interactions are a major area of interest within the field of educational research (Harper, 2018; Vandenbroucke et al., 2018). Interactions have been found to be a major component of teachers' well-being and influence (Spilt et al., 2011; Wubbels & Brekelmans, 2005). In addition, they play a key role in student learning and engagement (Nguyen et al., 2018; Perry et al., 2002). Among the practices that teachers can develop during these interactions, communication is central (Chickering & Gamson, 1987; Ramsden, 2003).

The last decades have seen a growing trend towards the study of this wide topic that encompasses dialogue, teacher's questions to students, and teachers' messages (Howe & Abedin, 2013). The latter is an increasingly studied area in teacher communication: evidence has shown that teachers' messages influence students' engagement, anxiety, and behaviour (Caldarella et al., 2020; Floress et al., 2018; Jenkins et al., 2015; Ntoumanis et al., 2017; Putwain et al., 2021; Symes & Putwain, 2016). However, these studies often focus on different dimensions of messages. While some examine the consequences of engaging or not engaging expressed in the messages (e.g., threats, praise, etc.), others focus on the motivation that the messages appeal to (e.g., value-promoting messages, etc.). In this context and following

Gigerenzer's (2017) recommendations on the integration of different theories, teachers' engaging messages emerged as a term that encompasses different types of value-promoting messages (Santana-Monagas et al., 2022). Engaging messages are those explicitly directed towards students with the purpose to engage them in their school tasks. These messages are characterised by emphasising the benefits or the disadvantages of engaging or not in a school task, and by appealing to different motivational incentives to engage students. These are delivered when teachers are not engaged in pure instruction, which is usually 20–30% of the lesson time (OECD, 2019a). However, these have been found to influence students in several ways. Using messages that emphasise the benefits, instead of the disadvantages, and that appeal to internal motivational incentives, instead of external incentives, have a positive impact on students' learning, vitality, motivation to learn and performance (Santana-Monagas et al., 2023; Santana-Monagas et al., 2022).

Prior research has also examined why teachers use different types of engaging messages with their students, concluding that autonomy for teaching fulfilment plays an important role (Santana-Monagas, Núñez, et al., 2022). However, these studies have two major limitations: (1) they assess teachers' engaging messages only through students' reports, which can lead to potential bias (Spooren et al., 2013; Urdan, 2004); and

\* Corresponding author.

E-mail addresses: [samuel.falcon@ulpgc.es](mailto:samuel.falcon@ulpgc.es) (S. Falcon), [wilfried@oslomet.no](mailto:wilfried@oslomet.no) (W. Admiraal), [jaime.leon@ulpgc.es](mailto:jaime.leon@ulpgc.es) (J. Leon).

(2) they have only focused on autonomy, without considering other variables, whether external or internal, that may influence teachers' use of messages (Collie & Martin, 2017; Granziera et al., 2019). In this research, we aim to address these two limitations by (1) collecting direct observations of teachers' messages through audio recordings and (2) studying the relation of students' performance and teachers' enthusiasm with their use of engaging messages, both of which have been found to influence teachers' behaviour (Keller et al., 2016; Parsons et al., 2018). This study aims to contribute to this growing area of research by applying an optimised direct collection method to the study of teachers' verbal practice. Furthermore, it explores the antecedents that might play a role in teachers' use of engaging messages.

### 1.1. Teachers' engaging messages

Engaging messages are a term for different types of value-promoting messages that teachers use to engage students in their school tasks (Santana-Monagas et al., 2022). They emerged as the result of the integration of two major theories: the Message Framing Theory (MFT; Rothman & Salovey, 1997), and the Self-Determination Theory (SDT; Deci & Ryan, 2016; Ryan & Deci, 2000b, 2020). The aim of engaging messages is to encompass these two theories in order to better understand how teachers engage learners.

The MFT focuses on messages' frame, which emphasises the benefits of doing an activity (*gain-framed*) or the disadvantages of not doing it (*loss-framed*). Research on teachers' messages based on this theory found that *loss-framed* messages can have positive effects on students' anxiety, behavioural engagement, and performance (Putwain et al., 2019; Putwain & Symes, 2011; Putwain, Symes, & Wilkinson, 2017). The SDT focuses on the different types of motivational incentives that drive people to engage in activities. For instance, teachers can appeal to external forms of motivation like rewards and punishments (i.e., *extrinsic* motivation) or feelings (i.e., *introjected* motivations), or to internal forms like the value of studies (i.e., *identified* motivation) or the pleasure of engaging (i.e., *intrinsic* motivations). Research on SDT has found that students who are internally motivated are more involved, perform better, and acquire higher quality learning (Taylor et al., 2014; Yamauchi & Tanaka, 1998). Under the umbrella of these theories, prior studies (Santana-Monagas et al., 2022) have conceptualized engaging messages in the following two dimensions: a 'frame' and an 'appeal' (Fig. 1).

Previous studies have shown that teachers, regardless of the motivation they are appealing to, tend to emphasise the importance of achievement (i.e., GPA, grade retention, etc.) to engage students (Boden et al., 2020; Dufaux, 2012; Faubert, 2009; Ryan & Brown, 2005; Ryan & Deci, 2000a). For example, they may use the achievement of good

grades as a reward, appealing to an *extrinsic* motivation, by telling their students: 'With a little more work, you will raise that grade a lot and your parents will buy you the bike'. However, they may also do so by making the students see that it will help them to get into the career they want, appealing to an *identified* motivation: 'With a little more work, you will raise that grade and it will be easier to get into medical school'.

Focus on achievement has been identified as an external motivation (Ryan & Deci, 2017). For this reason, a message that appeals to internal motivation, but emphasises achievement, might have a different effect than a message that also appeals to internal motivation but does not refer to achievement. However, in the school context, passing a subject or getting a good grade can be a potential goal that students are typically expected to identify with, because their future learning goals depend on it (Lim & Chapman, 2012). Thus, a message that appeals to external motivations, but emphasises achievement, may also have a different effect than a typical one. Therefore, since the focus on achievement is compatible with all *appeal* categories and might influence the message's effect, for each of the four *appeal* categories there is a subcategory focusing on *achievement*.

According to the combination of *frame* and *appeal*, teachers can rely on 16 different types of engaging messages to engage students: *gain-* and *loss-framed* both combined with one of the four *appeal* dimensions described in Fig. 1 and their four subcategories focused on *achievement*.

### 1.2. Previous studies on engaging messages

Research on teachers' engaging messages has shown that *gain-framed identified* and *gain-framed intrinsic* messages predict students' performance positively via their motivation to learn (Santana-Monagas et al., 2022). When teachers rely on messages that emphasise the benefits of engaging, appealing to what students can benefit from their studies and how much they can enjoy it, students become more motivated to learn. These authors also found the opposite, showing that *loss-framed* messages appealing to external motives had a negative influence on performance, corroborating the study by Putwain and Remedios (2014) on teachers' messages. In addition, Santana-Monagas et al. (2023) also found that *gain-framed identified* and *intrinsic* messages were related positively to teacher-student relatedness and students' vitality. Given these results, another study set out to determine why teachers used one type of message or another, showing that the teachers' autonomy for teaching fulfilment was related to the messages used (Santana-Monagas, Núñez, et al., 2022).

Such previous approaches, however, have only assessed teachers' engaging messages through students' reports, which can be biased when assessing teachers' use of messages (Putwain & Roberts, 2009). For instance, students' success, class attendance, or effort, and teachers'

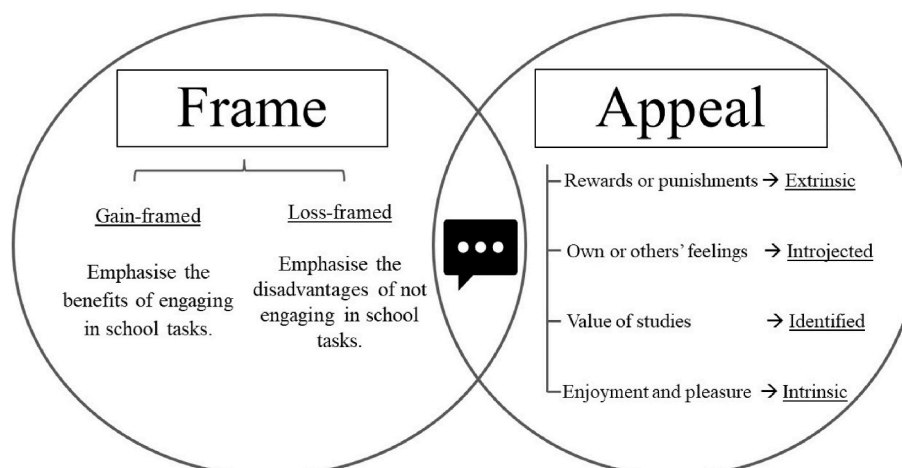


Fig. 1. Dimensions of teachers' engaging messages.

gender, reputation, or personal traits, might influence students' evaluation of the teacher (Spooren et al., 2013). Methodological research recommends the use of objective observational data to examine teacher behaviour in class (Muñoz et al., 2023; Tempelaar et al., 2020; Urdan, 2004).

### 1.3. Influence of students' performance

Teachers' behaviour and practices influence students' interest, engagement, learning, and academic performance (Smith & Baik, 2021; Vercellotti, 2018). However, much less is known about why teachers choose to adopt one type of practice over another. Research has found that teachers adapt their teaching based on characteristics and performance of their students (Parsons & Vaughn, 2016). For example, teachers have an ability to adapt their teaching practices with new students in a new school year, adjusting their practices to the learning needs of students (Granziera et al., 2019; Loughland & Alonzo, 2018; Martin et al., 2012).

As noted by Parsons et al. (2018), teachers adaptive behaviour include questioning, assessing, modelling, and challenging their students. Teachers can use their students' performance as an indicator to encourage them and try to influence their engagement and, in turn, their performance. Based on these results, it is pertinent to consider whether students' performance is associated with teachers' use of diverse types of engaging messages. As high performing students are likely to be already engaged (Lee, 2014), it might be expected that teachers use fewer engaging messages with high performing students.

### 1.4. Influence of teachers' enthusiasm

Research on what influences teachers' behaviour has also shown that the 'inner side' of the teacher (beliefs, well-being, and attitudes) influences their behaviour and performance, also known as their 'outer side' (Bandura, 1978; Hwang et al., 2017; Shen et al., 2015). For example, teachers' emotions and self-efficacy, inner side factors, have proven to influence their teaching quality and relations with students (Seligman & Csikszentmihalyi, 2000; Zwart et al., 2014). A recent study conducted by Hayashi and Sasaki (2022) found that the type of leadership teachers show influences their framing of the message. Authoritarian leaders were inclined to use *loss-framed* messages to motivate people, whereas transformational leaders tended to choose *gain-framed* messages. There is also strong evidence on the effects that teachers' autonomy fulfilment plays on teachers' behaviours in general (Korthagen & Evelein, 2016), and on their use of engaging messages, in particular (Santana-Monagas, Núñez, et al., 2022).

Regarding the study of inner variables influencing teachers' use of messages, we have to highlight Putwain's works. For example, Putwain and von der Embse (2018) found that teacher self-efficacy and belief that students would appraise messages as a threat, both inner variables, influenced teachers' use of messages. More related to our study is Putwain and Roberts' (2012) work, in which they examined the relation between teachers' beliefs about students and their use of fear appeals. They found that teachers rely more on this type of messages if they think students will find them motivating. This suggests that teachers with lower-achieving students may use these messages more than teachers with higher-achieving students. We also found Putwain et al.'s (2017) work relevant to our study as these authors found that teachers use more fear appeals if they perceive low engagement from their students. This further supports the idea that fear appeals are more likely to be used with lower-achieving students.

In recent years, there has been a growing interest in studying teachers' enthusiasm (OECD, 2019b). As noted by Keller et al. (2016) in their review, teachers' enthusiasm plays a fundamental role in their personal and professional lives, teaching effectiveness, and instructional quality. Teacher enthusiasm is conceptualized by Kunter et al. (2011) as a component of high-quality teaching that implies interest in the subject,

intrinsic motivation, positive emotions, and an improved teaching process. The authors also observed that enthusiasm for teaching was related to teachers' self-efficacy, professional well-being, and job satisfaction. In turn, these variables have already been shown to have a positive impact on teacher performance and behaviour (Bandura et al., 1977; Belcher et al., 2021; Day & Qing, 2009; Stephanou & Oikonomou, 2018). Enthusiasm is an important factor in a teacher's ability to motivate their students because it helps to create a positive and engaging learning environment (OECD, 2019b). When teachers are enthusiastic, they are more likely to effectively communicate their passion to their students and inspire them to learn. Enthusiasm also positively impacts different teachers' behaviour and practices in the classroom (Kunter et al., 2008), which, in turn, can increase students' motivation and engagement leading to improved learning outcomes. Finally, enthusiasm has been shown to be contagious (Sy et al., 2005), so a teacher who is enthusiastic can inspire their students to be enthusiastic as well. These findings suggest that teacher enthusiasm could be an important predictor of engaging messages and therefore warrants further examination.

### 1.5. The present study

This prospective study set out to assess the relation of students' performance and teachers' enthusiasm with teachers' use of engaging messages in high schools in Spain. Based on the established categories of engaging messages (Santana-Monagas, Núñez et al., 2022; Santana-Monagas et al., 2023; Santana-Monagas, Putwain et al., 2022), we examined the relationship between these variables to see whether they could predict the likelihood of teachers using different types of messages, and if so, to what extent they are related to the number of messages they use.

This can be achieved through a two-part model (Farewell et al., 2017). This type of analysis has been used before in meteorological, medical, and economical research when gathering naturalistic data on events that might have many zero observations (i.e., days of rain in the desert, prevalence of rare diseases in medicine, etc.) (Belotti et al., 2015). By doing so, two-part models allow to first analyse the probability of the event occurring according to certain factors, and then, if it does occur, how these factors are related to the number of times the event occurs. Engaging messages measured through direct observations are amenable to analysis with these models, as some teachers do not commonly use all types of messages (Santana-Monagas, Putwain et al., 2022). With this statistical technique, a logistic regression is performed in order to find out the probability of teachers using messages, followed by a linear regression, which shows how the number of messages teachers use is related to an input variable (Fig. 2).

We adopted a methodological approach framed within the line of audio recording, transcription, and codification of lessons, also known as of Transcript-Based Lesson Analysis (TBLA; Arani, 2017; Rahayu et al., 2020; Winarti et al., 2021). The TBLA methodology has several advantages, including more accurate data analysis, the opportunity to review data, and pauses for coders to think (Vrikki et al., 2019). With this methodology, we expected to surpass the limitations of previous studies and to gather more reliable evidence of relations between the teachers' use of different types of engaging messages and the variables that might be influencing this use.

The paper poses the following research questions.

RQ1: How will student performance interact with the likelihood of using engaging messages?

RQ2: Among teachers who use engaging messages, how will their students' performance be related to the number of engaging messages used?

RQ3: How will teacher enthusiasm for teaching interact with the likelihood of using engaging messages?

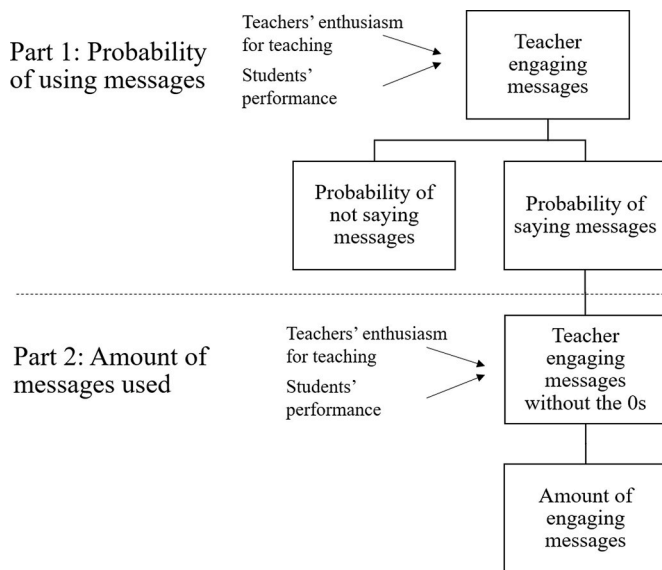


Fig. 2. Two-part model.

RQ4: Among teachers who use engaging messages, how will their enthusiasm for teaching be related to the number of engaging messages used?

We hypothesise that teachers with high-performing students will be less likely to use engaging messages than teachers of low-performing students (H1). For teachers who use messages, we expect student performance to be positively related to the number of messages used (H2). Similarly, we expect enthusiastic teachers to have a higher probability of using engaging messages (H3), and that among teacher who do use messages, enthusiastic teachers will have a higher use (H4).

The findings should make an important contribution to the field of teachers' messages. We hope that the innovative data collection and analysis methods will make it possible to collect naturalistic data more easily and to examine these efficiently. If so, these methods could be extended to other studies on teachers' verbal practices. Furthermore, we expect to contribute to the literature by revealing the relations of students' performance and teachers' enthusiasm with teachers' use of messages. This could be useful in designing future interventions aimed at modifying teachers' use of messages.

## 2. Material and methods

### 2.1. Participants

Participants were 39 teachers (22 females and 17 males; mean age = 45.98,  $SD = 7.99$ ) and their 963 students (468 females, 494 males and 1 unspecified; mean age = 16.39,  $SD = 1.27$ ). They belonged to 16 secondary schools in both urban and rural settings of Gran Canaria, Tenerife, and Santander (Spain). School populations were similar with respect to ethnic, socioeconomic status and achievement.

Teachers could choose to participate with one or more of the groups they taught leading to a total number of 59 groups recorded. The average number of students per group was 17.80 ( $SD = 5.14$ ). Students were Grade 9 (mean age = 14.71,  $SD = .68$ ) to 12 (mean age = 17.84,  $SD = .76$ ). Students' mean grades were 5.64 ( $SD = 2.43$ ) out of ten and varied from 3.23 ( $SD = 2.52$ ) in the lowest performing group to 9.47 ( $SD = .64$ ) in the highest performing. To reduce potential bias, all teachers taught Mathematics and all students attended Math lessons with the same intensity (i.e., four lessons per week).

We explained the aims of the study to participants, emphasising that their participation was voluntary and confidential, and asked for their

consent through an 'informed consent form'. The ethics section of the study was reviewed by an external committee and complied with data protection acts, directives, and opinions, both at the national and the European levels.

### 2.2. Procedure

Teachers' engaging messages were assessed through direct observation in audios that were recorded by the teachers. They recorded eight lessons at the end of the second term in each group, close to the final exams. It is important to note that the teachers in the study were working within an accountability structure that places high importance on student grades. This suggests that the teachers may have been more motivated to use engaging messages near the final exams in order to improve student performance on these tests.

We transcribed the audios with an artificial intelligence-based transcription service. In this way, the eight audios per student group were converted into approximately 100 pages of text. These transcripts were then filtered using a python script to detect a list of keywords that were very common in the messages, but less common in the rest of the text. The list of keywords was based on the questions of the validated Teachers' Engaging Messages Scale (Santana-Monagas, Putwain et al., 2022). Some of the keywords in this list were: "work", "pass", "daily", "learn", etc. The filtered transcript contained only 10% of the original transcript, which had a concentration of teachers' messages and false positives. Finally, we identified and codified messages of the filtered transcript. Students' performance from the first term was collected from high schools' official records. Teachers' enthusiasm for teaching was evaluated for each group on the first term by a questionnaire provided through Google Forms.

### 2.3. Instruments

#### 2.3.1. Teachers' engaging messages

To assess teachers' engaging messages from the filtered transcripts, three coders identified the messages and discarded the false positives. Coders had to select all those messages from the teacher that were aimed at engaging students in school tasks. In addition, these messages had to fulfil three conditions: (1) have a *frame*, either *gain* or *loss*, (2) *appeal* to a motivational incentive, and (3) be meaningful in their own sense (could be one or more sentences). Researchers provided them with examples of engaging messages until they were able to recognise them. Results of reliability showed a satisfactory average inter-coder agreement percentage of 98.71%. Cases where there was no agreement were settled by the researchers. Finally, after identifying the engaging messages in the filtered transcripts and following the methodology of other studies (Creswell, 2012), one researcher classified the messages into their categories while being supervised by another.

Messages were classified based on the two dimensions defined in the introduction: "frame" and "appeal". The resulting sixteen categories were: (1) *gain-framed extrinsic*, (2) *loss-framed extrinsic*, (3) *gain-framed extrinsic-achievement*, (4) *loss-framed extrinsic-achievement*, (5) *gain-framed introjected*, (6) *loss-framed introjected*, (7) *gain-framed introjected-achievement*, (8) *loss-framed introjected-achievement*, (9) *gain-framed identified*, (10) *loss-framed identified*, (11) *gain-framed identified-achievement*, (12) *loss-framed identified-achievement*, (13) *gain-framed intrinsic*, (14) *loss-framed intrinsic*, (15) *gain-framed intrinsic-achievement*, and (16) *loss-framed intrinsic-achievement*.

#### 2.3.2. Students' performance

Students' academic performance was measured through their grades in Mathematics, obtained from schools' official records. In Spain, teachers evaluate their students based on standardized rubrics created by the government, giving them a mark between 0 and 10 (Leon et al., 2017). These rubrics evaluate the same contents and competencies acquired by students throughout the course, regardless of the region in



which the school is located.

2.3.3. Teachers' enthusiasm for teaching

Teachers' enthusiasm for teaching was measured by one of the two subscales of the Teacher Enthusiasm Scale (Kunter et al., 2011). The subscale of enthusiasm for teaching was composed of 5 items (e.g., "I teach mathematics in this class with great enthusiasm") to which teachers were asked to respond on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). McDonald's Omega was used to examine the reliability of the instrument as it is more accurate than Cronbach's alpha (McNeish, 2018). McDonald's Omega was estimated using factor loadings from a congeneric CFA ( $\chi^2 = 16.21, df = 5, p\text{-value} = .006, RMSEA = .045, CFI = .970, TLI = .94, SRMR = .040$ ), showing a satisfactory .930. This variable was entered in the models as mean item scores.

2.4. Data analysis

For the statistical analysis, we transformed message counts into ratios. Following the methodology of previous research (Winarti et al., 2021), the most accurate way to obtain the ratios in this case was by dividing the number of messages of each category by the number of words spoken by the teacher. It enables to compare teachers who speak more and those who speak less (e.g., a teacher who said 15 gain-framed extrinsic messages in 50 000 words is not the same as another teacher who said 15 gain-framed extrinsic messages in 20 000 words).

This means the first teacher used .0003 messages from that category throughout all the words he said during his speech. Given that the obtained values were very small, we multiplied them by 10 000 for better interpretation. The final formula for the ratios was as follows: ratio =  $m/w * 10\ 000$ , where  $m$  = 'messages from one of the categories said by the teacher' and  $w$  = 'total number of words spoken by the teacher'.

The ratios obtained had a zero-inflated distribution (Fig. 3). To overcome this problem, we tested a two-part model (Belotti et al., 2015; Farewell et al., 2017; Muthén & Muthén, 2022). By applying this technique, we create a new binary and a new continuous variable from an original continuous variable. If the value of the original variable is equal to zero (no messages of that category have been said by that teacher in that student group), the new binary variable value is zero and the new continuous variable value is missing. On the contrary, if the value of the original variable is greater than zero (at least one message has been said

by that teacher in that student group), the new binary variable value is one and the new continuous variable value is the log of the original.

A logistic regression is then performed with the new binary variables, and a linear regression with the new continuous variables. As a result of the logistic regression, we obtain two indicators: an odds ratio, which inform us about the probability of a nonzero response compared to a zero response; and the logit (represented by  $\beta$ ), which is the natural logarithm of the odds ratio (Wooldridge, 2012). In this way, multiple logistic regression allows us to answer RQ1 and RQ3, while multiple linear regression allows us to answer RQ2 and RQ4. The resulting model is shown in Fig. 4.

All data analysis was performed with Mplus 8.8 (Muthén & Muthén, 2022). There were no missing data on either engaging messages or teacher enthusiasm. There was minor missing data (<5%) in students' performance because some teachers did not send their grades to us. These cases were excluded from the analyses.

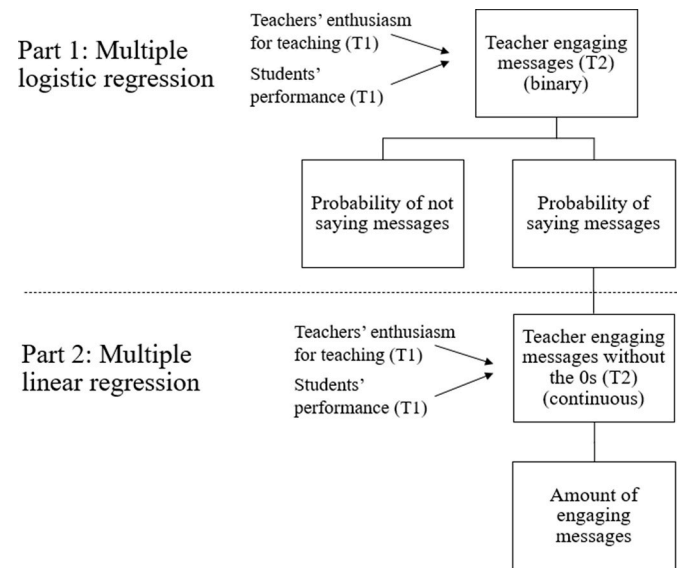


Fig. 4. Tested two-part model. Note. T1 = First term; T2 = Second term.

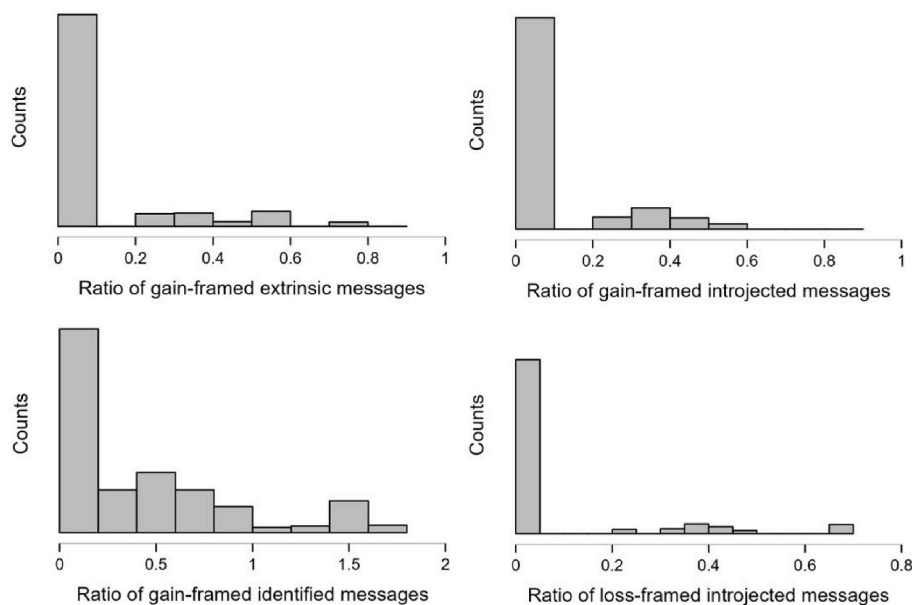


Fig. 3. Distribution of some of the message categories. Note. Distribution of the ratios of (1) gain-framed extrinsic messages, (2) gain-framed introjected messages, (3) gain-framed identified messages, and (4) loss-framed introjected messages. In all cases it can be observed the zero-inflated distribution of the data.

### 3. Results

After analysing the recordings, we identified and classified a total of 239 messages on the second term. The first set of analyses examined the descriptive statistics of these messages (Table 1).

As can be seen from Table 1, *gain-framed* and *loss-framed identified* and *identified-achievement* messages were the most frequently used by teachers. In other words, teachers mostly relied on messages that appeal to the value of studies, through achievement or other incentives, emphasising both the benefits of engaging and the disadvantages of not engaging in the school tasks.

On the other hand, *gain-framed* and *loss-framed intrinsic*, *intrinsic-achievement* and *introjected-achievement* messages were the least used. This means that teachers almost did not try to engage their students by appealing to the enjoyment of the activity itself, or by appealing to how they will feel because of their achievements.

#### 3.1. Two-part model

Due to the low number of observations of *gain-framed* and *loss-framed intrinsic*, *intrinsic-achievement* and *introjected-achievement* messages, we were unable to carry out statistical analyses with these categories. The rest of the categories could be analysed with a two-part model and the results are shown in the following table (Table 2).

##### 3.1.1. Relation between students' performance and teachers' use of engaging messages

From the left side of Table 2, we can see that the greater the students' performance, controlling for teachers' enthusiasm for teaching, the greater the likelihood of using *gain-framed* and *loss-framed extrinsic* messages. On the other hand, we can also see that the greater the students' performance, the lesser the probability of using *gain-framed extrinsic-achievement*, *identified*, and *identified-achievement* messages, and *loss-framed introjected*, and *identified-achievement* messages.

Focusing now on the linear regression (see the right part of Table 2), when teachers do use messages, the higher their students' performance (controlling for teaching enthusiasm), the higher their use of *gain-framed extrinsic* and *extrinsic-achievement* messages, and of *loss-framed extrinsic*, *extrinsic-achievement*, *introjected* and *identified* messages.

##### 3.1.2. Relation between teachers' enthusiasm for teaching and their use of engaging messages

Table 2 also shows the estimated effects of teachers' enthusiasm for

**Table 1**

Descriptive statistics of the messages detected in T2.

Messages		N	%
Appeal	Frame		
<i>Extrinsic</i>	<i>Gain</i>	17	7.11
<i>Extrinsic</i>	<i>Loss</i>	7	2.93
<i>Extrinsic-achievement</i>	<i>Gain</i>	7	2.93
<i>Extrinsic-achievement</i>	<i>Loss</i>	15	6.28
<i>Introjected</i>	<i>Gain</i>	10	4.18
<i>Introjected</i>	<i>Loss</i>	15	6.28
<i>Introjected-achievement</i>	<i>Gain</i>	1	.42
<i>Introjected-achievement</i>	<i>Loss</i>	1	.42
<i>Identified</i>	<i>Gain</i>	53	22.18
<i>Identified</i>	<i>Loss</i>	47	19.67
<i>Identified-achievement</i>	<i>Gain</i>	25	10.46
<i>Identified-achievement</i>	<i>Loss</i>	40	16.74
<i>Intrinsic</i>	<i>Gain</i>	1	.42
<i>Intrinsic</i>	<i>Loss</i>	0	.00
<i>Intrinsic-achievement</i>	<i>Gain</i>	0	.00
<i>Intrinsic-achievement</i>	<i>Loss</i>	0	.00
Total		239	100

Note. N = Number of observations; % = Percentage of the total number of messages observed.

teaching on their use of engaging messages, controlling for student performance. We can observe that the greater the teachers' enthusiasm for teaching, the lesser the likelihood of using *gain-framed extrinsic*, *identified* and *identified-achievement* messages, and *loss-framed identified* messages (see the left part of Table 2).

In the linear regression (see results at the left side of Table 2), when it comes to teachers who do use messages, the greater their enthusiasm for teaching (controlling for student performance), the greater their use of *gain-framed extrinsic-achievement*, *identified* and *identified-achievement* messages, and *loss-framed introjected*, *identified* and *identified-achievement* messages. However, there is one rather remarkable result when we look at the *loss-framed extrinsic-achievement* messages: it is the only case where the higher the teachers' enthusiasm, the lower their use of messages.

### 4. Discussion

The research questions of this study sought to determine the relation of students' academic performance and teachers' enthusiasm with teachers' use of engaging messages. We hypothesized that teachers with high-performing students would be less likely to use engaging messages (H1), and for teachers who used messages, we expected student performance to be positively related to the number of messages used (H2). We also expected enthusiastic teachers to have a higher probability of using engaging messages (H3), and that among teacher who did use messages, enthusiastic teachers would have a higher use (H4).

Regarding the research questions, results showed that when students have a higher performance, the likelihood of using *extrinsic* messages increases for both *frame* categories, while the likelihood of using other types of messages decreases (RQ1). However, when teachers do use messages, the higher their students' performance, the higher the use of almost all types of messages (e.g., *gain-framed extrinsic* and *extrinsic-achievement* messages, and of *loss-framed extrinsic*, *extrinsic-achievement*, *introjected* and *identified* messages; RQ2). When it comes to the enthusiasm for teaching, the greater the enthusiasm, the lesser the likelihood of using different types of messages (RQ3). When we focus on teachers who do use messages, results showed that the higher their enthusiasm, the higher the use of messages of almost all categories analysed, except for the *loss-framed extrinsic-achievement*, whose use decreased (RQ4).

Before discussing these results, it is important to mention that we could not find any *gain-framed* or *loss-framed intrinsic-achievement*, nor any *loss-framed intrinsic* messages. These results reflect those of Ryan and Deci (2017), who noted that teachers do not focus on intrinsically motivating students, and instead focus on external motivational appeals. We also found few messages from other categories (e.g., *gain-framed intrinsic* or *introjected-achievement*), even when the number of observations was high (approximately 8 h of audio in each of the 59 participating groups). This can be caused by, on the one hand, not all teachers using all types of messages (Santana-Monagas, Putwain et al., 2022) and, on the other hand, to the fact that teachers in Spain spend between 70 and 80% of the lesson time on instruction (OECD, 2019a). This means that the time in which engaging messages can be used is about 20–30% of each lesson. Together with the fact that we could not record lessons from the whole term, this may have been the reason for finding this number of messages in some categories. However, these data could be analysed using a two-part model, which is particularly useful for this type of situation, allowing all the research questions to be answered. The following sections will discuss the results obtained from the two-part models.

#### 4.1. Relation with students' performance

Regarding the RQ1, results shown positive relations between students' performance and the likelihood of using *gain-framed* and *loss-framed extrinsic* messages. Teachers with high performing students are more likely to rely on rewards and punishments to engage students in

**Table 2**  
Two-part model results.

Independent variables	Logistic regression					Linear regression					
	β	SE	P-value	OR	95% CI for OR		β	SE	P-value	95% CI for β	
					LL	UL				LL	UL
<i>Gain-framed extrinsic</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	<b>-.272</b>	.114	.017*	.762	.610	.952	<b>-1.60</b>	.239	.000*	<b>-2.07</b>	<b>-1.13</b>
Students' performance	.116	.034	.001*	1.12	1.05	1.20	.123	.015	.000*	.094	.153
<i>Loss-framed extrinsic</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	.030	.109	.782	1.03	.832	1.28	-.134	2.01	.947	-4.08	3.81
Students' performance	.112	.037	.002*	1.12	1.04	1.20	-.151	.313	.629	-.763	.462
<i>Gain-framed extrinsic-achievement</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	<b>-.181</b>	.111	.103	.835	.672	1.04	<b>-12.17</b>	1.87	.000*	<b>-15.84</b>	<b>-8.50</b>
Students' performance	<b>-.153</b>	.055	.005*	.858	.771	.955	1.58	.266	.000*	1.06	2.10
<i>Loss-framed extrinsic-achievement</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	.143	.119	.231	1.15	.913	1.46	.396	.433	.360	-.453	1.25
Students' performance	-.055	.037	.139	.947	.881	1.02	<b>-.248</b>	.063	.000*	<b>-.371</b>	<b>-.125</b>
<i>Gain-framed introjected</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	-.005	.126	.968	.995	.777	1.27	-.122	.571	.033	-2.34	-.101
Students' performance	.015	.042	.725	1.02	.935	1.10	.011	.087	.898	-.159	.181
<i>Loss-framed introjected</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	.315	.163	.054	1.37	.995	1.89	<b>-4.68</b>	.843	.000*	<b>-6.33</b>	<b>-3.02</b>
Students' performance	<b>-.095</b>	.038	.011*	.909	.845	.979	.506	.125	.000*	.262	.751
<i>Gain-framed identified</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	<b>-.864</b>	.153	.000*	.422	.312	.569	<b>-2.14</b>	.120	.000*	<b>-2.37</b>	<b>-1.90</b>
Students' performance	<b>-.202</b>	.032	.000*	.817	.768	.870	.233	.018	.000*	.198	.267
<i>Loss-framed identified</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	<b>-.630</b>	.121	.000*	.533	.420	.675	<b>-1.96</b>	.269	.000*	<b>-2.48</b>	<b>-1.43</b>
Students' performance	-.046	.030	.127	.955	.899	1.01	.168	.041	.000*	.087	.249
<i>Gain-framed identified-achievement</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	<b>-2.18</b>	.206	.000*	.113	.075	.169	<b>-1.88</b>	.156	.000*	<b>-2.19</b>	<b>-1.48</b>
Students' performance	<b>-.110</b>	.036	.002*	.896	.835	.961	.185	.024	.000*	.139	.246
<i>Loss-framed identified-achievement</i>											
<i>Intercept</i>											
Teachers' enthusiasm for teaching	.084	.103	.414	1.09	.889	1.33	<b>-2.85</b>	.424	.000*	<b>-3.68</b>	<b>-2.02</b>
Students' performance	<b>-.097</b>	.031	.002*	.908	.853	.965	.336	.070	.000*	.200	.473

Note. SE = standard error; OR = odds ratio; CI = confidence interval; LL = lower limit; UL = upper limit; \*p < 0.05. Significant effects are printed bold.

school tasks. However, we also found a negative relation with the likelihood of using *gain-framed extrinsic-achievement*, *identified*, and *identified-achievement* messages, and *loss-framed introjected*, and *identified-achievement* messages. This means that teachers with high performing students are not likely to appeal to rewards or punishments in terms of achievement, to feelings, and to the value of studies. At the same time, these results can also be understood in the opposite way: teachers who have students with low academic performance tend to use less *gain-framed* and *loss-framed extrinsic* messages and more of the other types of messages to engage them.

This finding is in line with our hypothesis (H1) and may be explained by the fact that students who have a good performance are already engaged in the subject (Lee, 2014). Under these circumstances, the teacher might not feel the need to use messages to engage them further. However, they still use *extrinsic* messages because teachers are used to rely on external appeals to engage students (Ryan & Brown, 2005; Ryan & Deci, 2000a, 2017), especially when they are already performing well.

Answering the RQ2, we found positive relations between students' performance and teachers' use of messages. Specifically, we found that the better the students' performance, the greater the use of *gain-framed extrinsic* and *extrinsic-achievement* messages, and of *loss-framed extrinsic*, *extrinsic-achievement*, *introjected* and *identified* messages. Thus, we can observe that as student performance increases, teachers who do use messages, use them more, by emphasising both the benefits of engaging

and the disadvantages of not doing so, and by appealing to both external and internal forms of motivation.

It is interesting to note that this partially repeats what was observed in the logistic regression. As performance increases, teachers use more *extrinsic* messages that focus on rewards and punishments as well as achievement. Another finding was that the better the students' performance, the higher the use of *loss-framed* messages that emphasise the disadvantages of not engaging in school tasks in almost all *appeal* categories. These results confirm hypothesis 2 and seem to be consistent with studies that have found that teachers usually rely on *loss-framed* messages to engage and motivate students (Nicholson et al., 2019; Putwain & Symes, 2011). Overall, the findings are consistent with previous research that has shown how teachers adapt their behaviours based on the performance of students to engage them (Parsons et al., 2018). In addition, they show the need to train teachers in the use of *gain-framed* messages that appeal to internal motivations, as these have been found to be the most beneficial in improving students' vitality, motivation, and performance (Santana-Monagas et al., 2023; Santana-Monagas, Putwain et al., 2022).

#### 4.2. Relation with enthusiasm for teaching

Regarding RQ3, we found a negative relation between enthusiasm for teaching and the likelihood of using *gain-framed extrinsic*, *identified*

and *identified-achievement* messages, and *loss-framed identified* messages. This suggests that the greater the enthusiasm for teaching, the less likely it is to use engaging messages. What is interesting about these findings is that we expected the opposite (H3). A possible explanation for this might be the false-consensus effect (Ross et al., 1977). Enthusiastic teachers may find their enthusiasm generalised, expanding it to students as well. In this way, thinking that students are already enthusiastic, they may believe that there is no reason to use messages to engage them. Another possible explanation may be that when teachers are enthusiastic, they transmit their enthusiasm to their students, improving their motivation and perseverance (OECD, 2019b; Sy et al., 2005). Under these conditions, the teacher may feel that it is not necessary to use explicit messages to engage students.

Answering the RQ4, among teachers who do use messages, we found a positive relation with the use of *gain-framed extrinsic-achievement*, *identified* and *identified-achievement* messages, and *loss-framed introjected*, *identified* and *identified-achievement* messages. In addition, we also observed a negative relation with the use of *loss-framed extrinsic-achievement* messages. In other words, if teachers use messages, the more enthusiastic, the more messages of almost all types they use. The only exception to this is found in the *loss-framed extrinsic-achievement* messages. The more enthusiastic teachers are, the less they try to engage students using messages that emphasise the disadvantages of not engaging in terms of obtaining grades or passing the subject as a reward or a punishment. These findings are in line with our hypothesis (H4) and with previous studies (Korthagen & Evelein, 2016; Kunter et al., 2011; Santana-Monagas, Núñez, et al., 2022; Shen et al., 2015): when teachers are more enthusiastic, they are also more satisfied and have higher self-efficacy, which in turn has a positive impact on their inner side and facilitates the use of engaging messages.

At first sight, the results obtained regarding the enthusiasm seem counterintuitive as they appear to contradict each other. When teachers are more enthusiastic, they are less likely to use engaging messages, but when they use them, the more enthusiastic, the more messages they use. However, these results are of a similar kind than the ones obtained by Olsen and Schafer (2001). They found that girls with less parental control were less likely to consume alcohol over time. However, when girls ingest alcohol, the less parental control the more alcohol they consumed. The relation found in our research between enthusiasm and the use of engaging messages follow a similar pattern and raises many questions. A further study focused on the mechanism is therefore suggested. This could allow researchers to find and better understand causal relations (Baron & Kenny, 1986; Hamaker et al., 2020; Kazdin, 2007). In addition, these results highlight the high potential of two-part models in educational research to study naturalistic data collected through direct observations with zero-inflated distributions.

#### 4.3. Limitations and future perspectives

Despite the contributions of this study, some limitations need to be addressed. First, this study was limited by the small sample size. Working with audio data, even with an optimised processing, is challenging and generates large amounts of data. The final step of codification of the filtered transcripts proved to be very laborious, as is often the case with studies of this kind (Rahman, 2016). However, thanks to advances in natural language processing (Hirschberg & Manning, 2015), we hope to further optimise the process. In future studies, text generative models such as GPT-3 (Brown et al., 2020) could be implemented to achieve the full automatization of the message processing. This could allow us to analyse more classes per term and to record teachers from other subjects as well.

Related to this first limitation is the number of messages found. We have already mentioned that not all teachers use all types of messages (Santana-Monagas, Putwain et al., 2022) and these can only be found in approximately 20–30% of the teachers' lesson time (OECD, 2019a). It is probable that in future studies, where more lessons will be analysed (e.

g., a whole term), a larger number of messages can be found. This will allow more robust statements to be made about the relationships found between objectively measured messages and other variables.

Since the study was limited to Spain, it was not possible to account for the cultural differences in the way teachers motivate and engage their students (Cothran et al., 2005; Hagger et al., 2007). A cross-cultural study including teachers from other countries is needed to examine whether there are differences in their use of engaging messages. For this purpose, it would also be helpful to have an automatic coding procedure such as the one mentioned above.

Following Putwain et al.'s (2018) findings on the impact of different types of pressures on teachers' use of fear appeals and timing reminders, it would be helpful for future studies to investigate the importance and consequences of final exams for students. By doing so, we can gain a better understanding of the situation's similarities to other contexts in which these messages are used, such as final exams that determine future educational or employment opportunities. Specifically, elaborating on the importance of final exams for students and how it may affect the use of engaging messages by teachers could contextualize the study better. For example, Grade 12 marks might be more crucial to students than Grade 9 marks because students in the final year before university are more aware of their GPA's significance. Additionally, exploring the accountability pressure that teachers feel to use messages to improve student outcomes could be an interesting aspect to analyse in future studies.

Several other questions remain to be answered. For instance, while we hypothesized that teacher enthusiasm would influence message use, further research is needed to fully understand the relation of enthusiasm for teaching with the use of engaging messages found in this study. One possible approach would be to conduct a survey of teachers to gather their beliefs about students' enthusiasm and test whether teachers believe that their own enthusiasm extends to students, which may be a false-consensus effect. By doing so, we may gain a better understanding of the counterintuitive results obtained.

In this study, we only considered the *gain* and *loss* categories in the frame dimension. However, it is important to note that prior research has found that *loss-framed* messages can have different effects on students depending on how the message is appraised (Putwain, Symes, & Wilkinson, 2017). If the message is perceived as threatening by students, their anxiety increases while engagement and performance decrease. Conversely, other studies found positive effects of *loss-framed* messages on students' outcomes, an effect that could be due to the teacher-student relatedness (Santana-Monagas, et al., 2023). From these studies, it seems that the key is for students to identify teachers as supportive persons. Therefore, future studies should explore whether the effects of *loss-framed* messages on anxiety and grades may be moderated by student-teacher relatedness and the perceived level of teacher support.

In addition, further research can analyse the role played by other professional and personal dimensions on the use of engaging messages. For example, the class size has proved to influence teachers' behaviour (Blatchford et al., 2011). Furthermore, teachers' beliefs, self-efficacy and well-being, have also proven to be related with their behaviour and performance (Li, 1999; Madsen & Olson, 2005; Spilt et al., 2011; Stephanou & Oikonomou, 2018). One starting point for this might be studying teachers' self-efficacy and their beliefs and perceptions of students, as was done by Putwain and Roberts (2012), Putwain, Nakhla, et al. (2017), and Putwain and von der Embse (2018). Future studies could integrate these dimensions, both personal and professional, to further explore why teachers use different types of engaging messages.

The methodology we have followed has proven to be useful for studying a teacher's verbal practice through direct observations. Similarly, we believe that many other studies focusing on teaching practices can make use of the TBLA methodology coupled with keyword filtering. We encourage researchers to use this methodology to study other teacher's verbal practices directly and to compare the results with those obtained through reports.



The results of this study align with those of prior research and provide valuable information for designing future interventions aimed at modifying teachers' use of engaging messages. Previous studies have concluded that teachers should focus on using more *gain-framed identified* and *intrinsic* messages to improve students' motivation to learn, vitality and performance (Santana-Monagas et al., 2023; Santana-Monagas, Putwain et al., 2022). For this reason, designing interventions aimed at teachers to this purpose could be worthwhile. Interventions directed at teachers rather than students have already proven to be efficient, as a single teacher may teach hundreds of students annually (Allen et al., 2011; Gregory et al., 2017). It has been found that an effective way to change teachers' behaviour is through interventions aimed at self-awareness of their practices (Abbate et al., 2006). This can be achieved by providing feedback, although previous studies have found that it is challenging to deliver teachers with frequent high-quality feedback (Kraft & Christian, 2022). However, by the methodology of this study, it would be easier to provide them with information on their actual use of engaging messages. This may be a satisfactory solution, as it is objective and simple for teachers to understand.

## 5. Conclusions

The present study was focused on examining the relations between students' performance, and teachers' enthusiasm for teaching, with their use of engaging messages. We measured the engaging messages by class recordings, which until now had only been measured through student reports. Using a two-part model, we were able to separately test whether these variables were related with the likelihood of using engaging messages, and the number of messages used. Our findings suggest that both factors, students' performance, and teachers' enthusiasm, are related with the use of engaging messages. We could observe that teachers with high-performing students were less likely to use almost every type of engaging messages, except for the ones that appealed to *extrinsic* motivations. In addition, when teachers did use engaging messages, the higher their students' performance, and their enthusiasm, the higher their use of messages in general. These findings offer an important contribution to the research as they allow to better understand the role of teachers' professional and personal dimensions on their use of engaging messages. In addition, they show the usefulness of the data collection method based on transcription and filtering in the assessment of these messages, and the utility of two-part models in the analysis of this type of data.

## Credit roles

**Samuel Falcon:** Formal analysis, Investigation, Writing - Original Draft, Writing - Review & Editing

**Jaime Leon:** Conceptualization, Methodology, Resources, Writing - Review & Editing, Supervision, Funding acquisition

**Wilfried Admiraal:** Writing - Review & Editing, Supervision

## Declaration of interest

None.

## Funding

The publication is part of the project TED2021-129268B-I00, funded by MCIN/AEI/10.13039/501100011033 and by the European Union "NextGenerationEU"/PRTR. It has also been funded by the Fundación Universitaria de Las Palmas, and by the University of Las Palmas de Gran Canaria through the pre-doctoral training programme for research personnel. Las Palmas de Gran Canaria, Cabildo de Gran Canaria, and Banco Santander through the pre-doctoral training programme for research personnel.

## References

- Abbate, C. S., Isgrò, A., Wicklund, R. A., & Boca, S. (2006). A field experiment on perspective-taking, helping, and self-awareness. *Basic and Applied Social Psychology*, 28(3), 283–287. [https://doi.org/10.1207/s15324834basps2803\\_7](https://doi.org/10.1207/s15324834basps2803_7)
- Allen, J. P., Pianta, R. C., Gregory, A., Mikami, A. Y., & Lun, J. (2011). An interaction-based approach to enhancing secondary school instruction and student achievement. *Science*, 333(6045), 1034–1037. <https://doi.org/10.1126/science.1207998>
- Arani, M. R. S. (2017). Raising the quality of teaching through Kyouzai Kenkyuu – the study of teaching materials. *International Journal for Lesson and Learning Studies*, 6(1), 10–26. <https://doi.org/10.1108/IJLLS-07-2016-0018>
- Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist*, 33(4), 344–358. <https://doi.org/10.1037/0003-066X.33.4.344>
- Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. *Journal of Personality and Social Psychology*, 35(3), 125–139.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi.org/10.1177/1350506818764762>
- Belcher, J., Wuthrich, V. M., & Lowe, C. (2021). Teachers use of fear appeals: Association with student and teacher mental health. *British Journal of Educational Psychology*. <https://doi.org/10.1111/bjep.12467>
- Belotti, F., Deb, P., Manning, W. G., Norton, E. C., & Arbor, A. (2015). twopm: Two-part models. *STATA Journal*, 15(1), 3–20.
- Blatchford, P., Bassett, P., & Brown, P. (2011). Examining the effect of class size on classroom engagement and teacher-pupil interaction: Differences in relation to pupil prior attainment and primary vs. secondary schools. *Learning and Instruction*, 21(6), 715–730. <https://doi.org/10.1016/j.learninstruc.2011.04.001>
- Boden, K. K., Zepeda, C. D., & Nokes-Malach, T. J. (2020). Achievement goals and conceptual learning: An examination of teacher talk. *Journal of Educational Psychology*, 112(6), 1221–1242. <https://doi.org/10.1037/edu0000421>
- Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., ... Amodei, D. (2020). Language models are few-shot learners. *Advances in Neural Information Processing Systems*, 33, 1877–1901.
- Caldarella, P., Larsen, R. A. A., Williams, L., Downs, K. R., Wills, H. P., & Wehby, J. H. (2020). Effects of teachers' praise-to-reprimand ratios on elementary students' on-task behaviour. *Educational Psychology*, 40(10), 1306–1322. <https://doi.org/10.1080/01443410.2020.1711872>
- Chickering, A., & Gamson, Z. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*. <https://doi.org/10.5551/jat.Er001>. March, 2–6.
- Collie, R. J., & Martin, A. J. (2017). Teachers' sense of adaptability: Examining links with perceived autonomy support, teachers' psychological functioning, and students' numeracy achievement. *Learning and Individual Differences*, 55, 29–39. <https://doi.org/10.1016/j.lindif.2017.03.003>
- Cothran, D. J., Kullinna, P. H., Banville, D., Choi, E., Amade-Escot, C., MacPhail, A., Macdonald, D., Richard, J. F., Sarmento, P., & Kirk, D. (2005). A cross-cultural investigation of the use of teaching styles. *Research Quarterly for Exercise & Sport*, 76(2), 193–201. <https://doi.org/10.1080/02701367.2005.10599280>
- Creswell, J. (2012). Second edition qualitative inquiry & research design choosing among five approaches. In *Design: Choosing among five approaches (issue June)*.
- Day, C., & Qing, G. (2009). Teacher emotions: Well being and effectiveness. In P. A. Schutz, & M. Zembylas (Eds.), *Advances in teacher emotion research: The impact on teachers' lives* (pp. 15–31). Springer US. [https://doi.org/10.1007/978-1-4419-0564-2\\_2](https://doi.org/10.1007/978-1-4419-0564-2_2).
- Deci, E., & Ryan, R. (2016). Optimizing students' motivation in the era of testing and pressure: A self-determination theory perspective. 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. 9–29). Springer Singapore. [https://doi.org/10.1007/978-981-287-630-0\\_2](https://doi.org/10.1007/978-981-287-630-0_2).
- Dufaux, S. (2012). Assessment for qualification and certification in upper secondary education. A review of country practices and research evidence. *OECD Education Working Papers*, 83.
- Farewell, V. T., Long, D. L., Tom, B. D. M., Yiu, S., & Su, L. (2017). Two-part and related regression models for longitudinal data. *Annual Review of Statistics and Its Application*, 4, 283–315. <https://doi.org/10.1146/annurev-statistics-060116-054131>
- Faubert, V. (2009). *School evaluation: Current practices in OECD countries and a literature review*. *OECD education working papers*, No. 42 (Vol. 42). OECD Education Working Papers.
- Floress, M. T., Jenkins, L. N., Reinke, W. M., & McKown, L. (2018). General education teachers' natural rates of praise: A preliminary investigation. *Behavioral Disorders*, 43(4), 411–422. <https://doi.org/10.1177/0198742917709472>
- Gigerenzer, G. (2017). A theory integration program. *Decision*, 4(3), 133–145. <https://doi.org/10.1037/dec000082>
- Granziera, H., Collie, R. J., & Martin, A. J. (2019). Adaptability: An important capacity to cultivate among pre-service teachers in teacher education programmes. *Psychology Teaching Review*, 25(1).
- Gregory, A., Ruzek, E., Hafen, C. A., Mikami, A. Y., Allen, J. P., & Pianta, R. C. (2017). My teaching partner-secondary: A video-based coaching model. *Theory Into Practice*, 56(1), 38–45. <https://doi.org/10.1080/00405841.2016.1260402>
- Hagger, M. S., Chatzisarantis, N. L. D., Hein, V., Pihu, M., Soós, I., & Karsai, I. (2007). The perceived autonomy support scale for exercise settings (PASSSES): Development, validity, and cross-cultural invariance in young people. *Psychology of Sport and Exercise*, 8(5), 632–653. <https://doi.org/10.1016/j.psychsport.2006.09.001>
- Hamaker, E. L., Mulder, J. D., & van IJzendoorn, M. H. (2020). Description, prediction and causation: Methodological challenges of studying child and adolescent

- development. *Developmental Cognitive Neuroscience*, 46, Article 100867. <https://doi.org/10.1016/J.DCN.2020.100867>
- Harper, B. (2018). Technology and teacher–student interactions: A review of empirical research. *Journal of Research on Technology in Education*, 50(3), 214–225. <https://doi.org/10.1080/15391523.2018.1450690>
- Hayashi, Y., & Sasaki, H. (2022). Effect of leaders' regulatory-fit messages on followers' motivation. *Journal of Applied Social Psychology*. <https://doi.org/10.1111/jasp.12874>
- Hirschberg, J., & Manning, C. D. (2015). Advances in natural language processing. *Science*, 349(6245), 261–266. <https://www.science.org>
- Howe, C., & Abedin, M. (2013). Classroom dialogue: A systematic review across four decades of research. *Cambridge Journal of Education*, 43(3), 325–356. <https://doi.org/10.1080/0305764X.2013.786024>
- Hwang, Y. S., Bartlett, B., Greben, M., & Hand, K. (2017). A systematic review of mindfulness interventions for in-service teachers: A tool to enhance teacher wellbeing and performance. *Teaching and Teacher Education*, 64, 26–42. <https://doi.org/10.1016/j.tate.2017.01.015>
- Jenkins, L. N., Floress, M. T., & Reinke, W. (2015). Rates and types of teacher praise: A review and future directions. *Psychology in the Schools*, 52(5), 463–476. <https://doi.org/10.1002/pits.21835>
- Kazdin, A. E. (2007). Mediators and mechanisms of change in psychotherapy research. *Annual Review of Clinical Psychology*, 3, 1–27. <https://doi.org/10.1146/annurev.clinpsy.3.022806.091432>
- Keller, M. M., Hoy, A. W., Goetz, T., & Frenzel, A. C. (2016). Teacher enthusiasm: Reviewing and redefining a complex construct. *Educational Psychology Review*, 28, 743–769. <https://doi.org/10.1007/s10648-015-9354-y>
- Korthagen, F. A. J., & Evelein, F. G. (2016). Relations between student teachers' basic needs fulfillment and their teaching behavior. *Teaching and Teacher Education*, 60, 234–244. <https://doi.org/10.1016/j.tate.2016.08.021>
- Kraft, M. A., & Christian, A. (2022). Can teacher evaluation systems produce high-quality feedback? An administrator training field experiment. *American Educational Research Journal*, 59(3), 500–537. <https://doi.org/10.3102/00028312211024603>
- Kunter, M., Frenzel, A., Nagy, G., Baumert, J., & Pekrun, R. (2011). Teacher enthusiasm: Dimensionality and context specificity. *Contemporary Educational Psychology*, 36(4), 289–301. <https://doi.org/10.1016/j.cedpsych.2011.07.001>
- Kunter, M., Tsai, Y. M., Klusmann, U., Brunner, M., Krauss, S., & Baumert, J. (2008). Students' and mathematics teachers' perceptions of teacher enthusiasm and instruction. *Learning and Instruction*, 18(5), 468–482. <https://doi.org/10.1016/j.learninstruc.2008.06.008>
- Lee, J. S. (2014). The relationship between student engagement and academic performance: Is it a myth or reality? *Journal of Educational Research*, 107(3), 177–185. <https://doi.org/10.1080/00220671.2013.807491>
- Leon, J., Medina-Garrido, E., & Núñez, J. L. (2017). Teaching quality in Math class: The development of a scale and the analysis of its relationship with engagement and achievement. *Frontiers in Psychology*, 8, 1–14. <https://doi.org/10.3389/fpsyg.2017.00895>
- Li, Q. (1999). Educational research teachers' beliefs and gender differences in mathematics: A review. *Educational Research*, 41(1), 63–76. <https://doi.org/10.1080/0013188990410106>
- Lim, S. Y., & Chapman, E. (2012). An investigation of the fennema-herman mathematics anxiety subscale. *Measurement and Evaluation in Counseling and Development*, 46(1), 26–37. <https://doi.org/10.1177/0748175612459198>
- Loughland, T., & Alonzo, D. (2018). Teacher adaptive practices: Examining links with teacher self-efficacy, perceived autonomy support and teachers' sense of adaptability. *Educational Practice and Theory*, 40(2), 55–70. <https://doi.org/10.7459/ep/40.2.04>
- Madsen, A. J., & Olson, J. K. (2005). Student teachers' use of learning theories to diagnose children's learning difficulties. *Journal of Elementary Science Education*, 17(1), 55–68.
- Martin, A. J., Nejad, H., Colmar, S., & Liem, G. A. D. (2012). Adaptability: Conceptual and empirical perspectives on responses to change, novelty and uncertainty. *Australian Journal of Guidance and Counselling*, 22(1), 58–81. <https://doi.org/10.1017/jgc.2012.8>
- McNeish, D. (2018). Thanks coefficient alpha, We'll take it from here. *Psychological Methods*, 23(3), 412–433. <https://doi.org/10.1037/met0000144>
- Muñoz, Espiñeira-Bellón, E. M., & Pérez, M. C. (2023). Percepciones sobre la evaluación de resultados de aprendizaje en títulos de máster. *Revista de Investigación Educativa*, 41(1), 243–261. <https://doi.org/10.6018/rie.520831>
- Muthén, L. K., & Muthén, B. O. (2022). *Mplus: Statistical analysis with latent variables: User's guide (Authors) Version 8.8*. .
- Nguyen, T. D., Cannata, M., & Miller, J. (2018). Understanding student behavioral engagement: Importance of student interaction with peers and teachers. *Journal of Educational Research*, 111(2), 163–174. <https://doi.org/10.1080/00220671.2016.1220359>
- Nicholson, L., Putwain, D. W., Nakhla, G., Porter, B., Liversidge, A., & Reece, M. (2019). A person-centered approach to students' evaluations of perceived fear appeals and their association with engagement. *The Journal of Experimental Education*, 87(1), 139–160. <https://doi.org/10.1080/00220973.2018.1448745>
- Ntoumanis, N., Quested, E., Reeve, J., & Cheon, S. H. (2017). Need supportive communication: Implications for motivation in sport, exercise, and physical activity. In *Persuasion and communication in sport, exercise, and physical activity*. <https://www.researchgate.net/publication/312296759>.
- OECD. (2019a). *TALIS 2018 results (volume I): Teachers and school leaders as lifelong learners*. TALIS. OECD Publishing.
- OECD. (2019b). Teacher enthusiasm. In *PISA 2018 results (volume III): What school life means for students' lives* (pp. 87–95). OECD Publishing. <https://doi.org/10.1787/acd78851-en>.
- Olsen, M. K., & Schafer, J. L. (2001). A two-Part Random-effects model for semicontinuous longitudinal data. *Journal of the American Statistical Association*, 95(454), 730–745.
- Parsons, S. A., & Vaughn, M. (2016). Toward adaptability: Where to from here? *Theory Into Practice*, 55(3), 267–274. <https://doi.org/10.1080/00405841.2016.1173998>
- Parsons, S. A., Vaughn, M., Scales, R. Q., Gallagher, M. A., Parsons, A. W., Davis, S. G., Pierczynski, M., & Allen, M. (2018). Teachers' instructional adaptations: A research synthesis. *Review of Educational Research*, 88(2), 205–242. <https://doi.org/10.3102/0034654317743198>
- Perry, N. E., VandeKamp, K. O., Mercer, L. K., & Nordby, C. J. (2002). Investigating teacher-student interactions that foster self-regulated learning. *Educational Psychologist*, 37(1), 5–15. [https://doi.org/10.1207/S15326985EP3701\\_2](https://doi.org/10.1207/S15326985EP3701_2)
- Putwain, D. W., Nakhla, G., Liversidge, A., Nicholson, L. J., Porter, B., & Reece, M. (2017). Teachers use of fear appeals prior to a high-stakes examination: Is frequency linked to perceived student engagement and how do students respond? *Teaching and Teacher Education*, 61, 73–83. <https://doi.org/10.1016/j.tate.2016.10.003>
- Putwain, D. W., & Remedios, R. (2014). The scare tactic: Do fear appeals predict motivation and exam scores? *School Psychology Quarterly*, 29(4), 503–516. <https://doi.org/10.1037/spq0000048>
- Putwain, D. W., & Roberts, C. (2009). The development of an instrument to measure teachers' use of fear appeals in the GCSE classroom. *British Journal of Educational Psychology*, 79(4), 643–661. <https://doi.org/10.1348/000709909X426130>
- Putwain, D. W., & Roberts, C. M. (2012). Fear and efficacy appeals in the classroom: The secondary teachers' perspective. *Educational Psychology*, 32(3), 355–372. <https://doi.org/10.1080/01443410.2012.659845>
- Putwain, D. W., & Symes, W. (2011). Teachers' use of fear appeals in the Mathematics classroom: Worrying or motivating students? *British Journal of Educational Psychology*, 81, 456–474. <https://doi.org/10.1348/2044-8279.002005>
- Putwain, D. W., Symes, W., & McCaldin, T. (2019). Teacher use of loss-focused, utility value messages, prior to high-stakes examinations, and their appraisal by students. *Journal of Psychoeducational Assessment*, 37(2), 169–180. <https://doi.org/10.1177/0734282917724905>
- Putwain, D. W., Symes, W., Nicholson, L. J., & Remedios, R. (2021). Teacher motivational messages used prior to examinations: What are they, how are they evaluated, and what are their educational outcomes?. In *Advances in motivation science* (pp. 63–103). Elsevier Ltd. <https://doi.org/10.1016/bs.adms.2020.01.001>. Vol. 8.
- Putwain, D. W., Symes, W., & Wilkinson, H. M. (2017). Fear appeals, engagement, and examination performance: The role of challenge and threat appraisals. *British Journal of Educational Psychology*, 87(1), 16–31. <https://doi.org/10.1111/bjep.12132>
- Putwain, D. W., & von der Embse, N. P. (2018). Teachers use of fear appeals and timing reminders prior to high-stakes examinations: Pressure from above, below, and within. *Social Psychology of Education*, 21(5), 1001–1019. <https://doi.org/10.1007/s11218-018-9448-8>
- Rahayu, D. S., Rahmawan, S., Hendayana, S., Muslim, M., & Sendi, S. (2020). Pattern of analysis students' knowledge construction using transcript-based lesson analysis. *Advances in Social Science, Education and Humanities Research*, 438, 140–144. <https://doi.org/10.2991/assehr.k.200513.032>. Aes 2019.
- Rahman, M. S. (2016). The advantages and disadvantages of using qualitative and quantitative approaches and methods in language “testing and assessment” research: A literature review. *Journal of Education and Learning*, 6(1), 102. <https://doi.org/10.5539/jel.v6n1p102>
- Ramsden, P. (2003). Learning to teach in higher education. In *Studies in higher education*. Routledge/Falmer. <https://doi.org/10.1080/0307507931231382498>
- Ross, L., Greene, D., & House, P. (1977). The “false consensus effect”: An egocentric bias in social perception and attribution processes. *Journal of Experimental Social Psychology*, 13, 279–301.
- Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, 121(1), 3–19. <https://doi.org/10.1037/0033-2909.121.1.3>
- Ryan, R., & Brown, K. (2005). Legislating competence: High-stakes testing policies and their relations with psychological theories and research. In A. J. Elliot, & C. S. Dweck (Eds.), *Handbook of competence and motivation*. The Guilford Press.
- Ryan, R., & Deci, E. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(1), 54–67. <https://doi.org/10.1006/ceps.1999.1020>
- Ryan, R., & Deci, E. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Ryan, R., & Deci, E. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness. In *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. The Guilford Press. <https://doi.org/10.1521/978.14625/28806>.
- Ryan, R., & Deci, E. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, Article 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Santana-Monagas, E., Núñez, J. L., Loro, J. F., Huéscar, E., & León, J. (2022). Teachers' engaging messages: The role of perceived autonomy, competence and relatedness. *Teaching and Teacher Education*, 109, 103556.
- Santana-Monagas, E., Núñez, J. L., Loro, J. F., Moreno-Murcia, J. A., & León, J. (2023). What makes a student feel vital? Links between teacher-student relatedness and

- teachers' engaging messages. *European Journal of Psychology of Education*. <https://doi.org/10.1007/s10212-022-00642-9>.
- Santana-Monagas, E., Putwain, D. W., Núñez, J., Loro, J., & León, J. (2022). Do teachers' engaging messages predict motivation to learn and performance? *Revista de Psicodidáctica*, 27(1), 86–95. <https://doi.org/10.1016/j.psicoe.2021.11.001>.
- Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology. An introduction. *American Psychologist*, 55(1), 5–14. <https://doi.org/10.1037/0003-066X.55.1.5>
- Shen, B., McCaughy, N., Martin, J., Garn, A., Kulik, N., & Fahlman, M. (2015). The relationship between teacher burnout and student motivation. *British Journal of Educational Psychology*, 85(4), 519–532. <https://doi.org/10.1111/bjep.12089>
- Smith, C. D., & Baik, C. (2021). High-impact teaching practices in higher education: A best evidence review. *Studies in Higher Education*, 46(8), 1696–1713. <https://doi.org/10.1080/03075079.2019.1698539>
- Spilt, J. L., Koomen, H. M. Y., & Thijs, J. T. (2011). Teacher wellbeing: The importance of teacher-student relationships. *Educational Psychology Review*, 23, 457–477. <https://doi.org/10.1007/s10648-011-9170-y>
- Spooren, P., Brocx, B., & Mortelmans, D. (2013). On the validity of student evaluation of teaching: The state of the art. *Review of Educational Research*, 83(4), 598–642. <https://doi.org/10.3102/0034654313496870>
- Stephanou, G., & Oikonomou, A. (2018). Teacher emotions in primary and secondary education: Effects of self-efficacy and collective-efficacy, and problem-solving appraisal as a moderating mechanism. *Psychology*, 820–875. <https://doi.org/10.4236/psych.2018.94053>, 09(04).
- Sy, T., Côté, S., & Saavedra, R. (2005). The contagious leader: Impact of the leader's mood on the mood of group members, group affective tone, and group processes. *Journal of Applied Psychology*, 90(2), 295–305. <https://doi.org/10.1037/0021-9010.90.2.295>
- Symes, W., & Putwain, D. W. (2016). The role of attainment value, academic self-efficacy, and message frame in the appraisal of value-promoting messages. *British Journal of Educational Psychology*, 86(3), 446–460. <https://doi.org/10.1111/bjep.12117>
- Taylor, G., Jungert, T., Mageau, G. A., Schattke, K., Dedic, H., Rosenfield, S., & Koestner, R. (2014). A self-determination theory approach to predicting school achievement over time: The unique role of intrinsic motivation. *Contemporary Educational Psychology*, 39(4), 342–358. <https://doi.org/10.1016/j.cedpsych.2014.08.002>
- Tempelaar, D., Rienties, B., & Nguyen, Q. (2020). Subjective data, objective data and the role of bias in predictive modelling: Lessons from a dispositional learning analytics application. *PLoS One*, 15(6), 1–29. <https://doi.org/10.1371/journal.pone.0233977>
- Urdan, T. (2004). Using multiple methods to assess students' perceptions of classroom goal structures. *European Psychologist*, 9(4), 222–231. <https://doi.org/10.1027/1016-9040.9.4.222>
- Vandenbroucke, L., Spilt, J., Verschueren, K., Piccinin, C., & Baeyens, D. (2018). The classroom as a developmental context for cognitive development: A meta-analysis on the importance of teacher-student interactions for children's executive functions. *Review of Educational Research*, 88(1), 125–164. <https://doi.org/10.3102/0034654317743200>
- Vercellotti, M. lou (2018). Do interactive learning spaces increase student achievement? A comparison of classroom context. *Active Learning in Higher Education*, 19(3), 197–210. <https://doi.org/10.1177/1469787417735606>
- Vrikki, M., Kershner, R., Calcagni, E., Hennessy, S., Lee, L., Hernández, F., Estrada, N., & Ahmed, F. (2019). The teacher scheme for educational dialogue analysis (T-SEDA): Developing a research-based observation tool for supporting teacher inquiry into pupils' participation in classroom dialogue. *International Journal of Research and Method in Education*, 42(2), 185–203. <https://doi.org/10.1080/1743727X.2018.1467890>
- Winarti, A., Saadi, P., & Rajiani, I. (2021). Applying transcript based lesson analysis in enhancing communication pattern between teacher and students in chemistry classroom. *European Journal of Educational Research*, 10(2), 975–987. <https://doi.org/10.12973/EU-JER.10.2.975>
- Wooldridge, J. M. (2012). *Introductory econometrics: A modern approach* (7th ed.). Cengage Learning.
- Wubbels, T., & Brekelmans, M. (2005). Two decades of research on teacher-student relationships in class. *International Journal of Educational Research*, 43(1–2), 6–24. <https://doi.org/10.1016/j.ijer.2006.03.003>
- Yamauchi, H., & Tanaka, K. (1998). Relations of autonomy, self-referenced beliefs, and self-regulated learning among Japanese children. *Psychological Reports*, 82(3), 803–816. <https://doi.org/10.2466/PRO.82.3.803-816>. Pt 1.
- Zwart, R. C., Korthagen, F. A. J., & Attema-Noordewier, S. (2014). Professional Development in Education A strength-based approach to teacher professional development A strength-based approach to teacher professional development. *Professional Development in Education*, 41(3), 579–596. <https://doi.org/10.1080/19415257.2014.919341>