Central and attributional models of student perception of teaching and their learning

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Abstract

Introduction: The central model of student perceptions presented, offering a general characterization of their perception and its role in the relationship between teaching, learning and context, from a socio-cognitive perspective. Also, the attributional model of student perception is presented, which is based on the central model and integrates the view of Weiner's attributional theory. **Background:** The theoretical contribution made is based on the analysis of the student's perception from the perspective of cognitive social psychology and socio-cognitive theories of motivation, and a substantive approach to construct validity. **Discussion:**The models presented offer a useful conceptual framework for research on the quality of teaching and learning, the development and validation of instruments, and educational evaluation.

Keywords: perception; teacher effectiveness; construct validity; social psychology; student motivation

Modelos central y atribucional de la percepción estudiantil de la enseñanza y de su aprendizajeg

Resumen

Introducción: Se presenta el modelo central de la percepción del estudiante. Este modelo ofrece una caracterización general de la percepción del estudiante y del papel que esta tiene en la relación entre la enseñanza, el aprendizaje y el contexto. Este modelo sigue una perspectiva socio-cognitiva. También, se presenta el modelo atribucional de la percepción del estudiante, que se basa en el modelo central e integra la mirada de la teoría atribucional de Weiner. **Antecedentes:** El aporte teórico realizado se basa en el análisis de la percepción del estudiante desde la mirada de la psicología social cognitiva y teorías socio-cognitivas de la motivación, y un enfoque substantivo a la validez de constructo. **Discusión:** Los modelos presentados ofrecen un marco conceptual útil para la investigación de la calidad de la enseñanza y el aprendizaje, el desarrollo de instrumentos, estudio de su validez y en evaluación educativa. .

Palabras clave: percepción; eficacia del docente; validez de constructo; psicología social; motivación del estudiante.

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Introduction

The students' ability to perceive and evaluate teaching is widely used in educational research and evaluation. The use of student evaluation of teaching questionnaires (SET questionnaires) is an example of a widespread application in many universities around the world. However, research on the validity of SET questionnaires often does not consider theoretical models of student perception of teaching and their learning process. In this paper, the central model of student perception is presented. This model offers a general characterization of student perception and the role it plays in the relationship between teaching, learning, and context. This model follows a social cognitive perspective. Also, the attribution model of student perception is presented, which is based on the core model and integrates the vision of attribution theory (Weiner, 2013). From this contribution it is possible to develop a substantive approach to the construct validity of measurement instruments on teaching and learning at the university. Additionally, this theoretical development allows us to develop a conceptual framework useful for the analysis and interpretation of the data obtained with questionnaires used in this area.

The measurement of various constructs used in educational research and evaluation are based on the students' ability to perceive and evaluate the teaching and learning process. Measuring the effectiveness or quality of teaching through SET questionnaires is an example of this. SET questionnaires are widely used as a source of feedback about the quality of teaching and as a source of data to improve teaching, to make management and administrative decisions, and to study the relationship between teaching and learning (Brown, 2011; Madichie, 2011; Marsh, 1987; Seldin, 1989; Kulik, 2001; Wright, 2006).

On the other hand, student perception is widely used in educational research as a source of information that allows measuring relevant constructs for this process, such as types of causal attributions, learning self efficacy, outcome expectancy, intrinsic motivation, perceived self determination, strategy use, persistence, help-seeking behaviors, self-theories of intelligence (Dweck, 2000; Pintrich et al., 1991; Ryan & Deci, 2017; Schunk et al., 2014; Weiner, 2013, 2018; Williams et al., 2011a, 2011b; Williams & Deci, 1996). The aforementioned constructs play an important role in social cognitive theories of motivation applied in research on teaching and learning (Dweck, 2000, 1986; Gredler, 2009; Ryan & Deci, 2017, Schunk et al., 2014).

Despite the widespread use of student perceptions as a source of information, there is a significant lack of research on the quality or efficacy of teaching in university education or on the validity of SET questionnaires. This limitation is linked to the scarce development and application of theoretical models that take this perception as a key element to understand the relationship between teaching and learning processes, which contrasts with other areas of research on teaching, motivation, and learning. In this research, it is clear that perception can be affected by events that occur in the classroom, and these can influence learning through aspects such as student attitudes, meta-cognition, self-image, strategy use, expectancy, perceived self-efficacy, and types of attributions (Brophy & Good, 1986; Bandura, 1986; Flavell, 2019; Marsh & Shavelson, 1985; Shuell, 1986; Zhang et al., 2022). Not only is it considered that teaching can affect perception, which can influence learning, but also reciprocally; the changes in perception can have an impact on how teaching is conducted in the classroom (Schunk & Meece, 2012).

In addition, there is a lack of theoretical frameworks and methodological methods that clearly establish conditions for the validity of teaching quality measures obtained with SET questionnaires. One of the problems that can be observed in works on the validity of these questionnaires is the interpretation of correlations between student or contextual characteristics with the scores obtained with SET questionnaires as evidence of lack of validity or bias (Aleamoni, 1987; Theall & Franklin, 2001; Marsh, 1980; Marsh & Roche, 1997; Valencia, 2022). As pointed out by Marsh & Roche (1997), many studies that assess potential biases adopt erroneous conceptual and operational definitions

and lack an adequate approach to construct validity. This paper proposes theoretical models that contribute to overcoming the limitations pointed out by providing a better understanding of student perception and its role in the relationship between teaching and learning.

Variables considered as potential biases are those that are assumed to be unrelated to measures of teaching effectiveness but do affect SET scores (Marsh, 1987). Some examples are students' gender, prior interest, expected grade, teachers' gender, year and age, number of students in the course, and whether the course is compulsory or elective. Many studies have problems in how they base such an assumption and present methodological and theoretical limitations. However, student perception of teaching can be analyzed as an individual's perception from the perspective of social cognitive psychology (Gilovich et al., 2023; Hamilton et al., 2020; Sutton et al., 2019). This perspective can serve as a theoretical foundation to provide answers to the aforementioned limitations.

Social cognitive psychology can be applied to develop models of student perception that help us understand the relationship between teaching, learning, and context. Applying this perspective, a substantive approach to construct validity can be developed based on the analysis of construct representation, which involves the processes, strategies, and knowledge structures that are present in the response to scale items, and which provides evidence to support theoretical and empirical analysis of processes, strategies, and knowledge (Embretson, 1994; Messick, 1995).

Substantive Approach to Construct Validity

The theoretical contribution that we present here allows us to develop a substantive approach to construct validity based on the perspective of social cognitive psychology and social cognitive theories of motivation that have been applied in learning and teaching research. This is a cognitivist approach in which concepts such as cognitive information, mental processes, and structures are a fundamental part when explaining perception, emotional responses, and behavior. Cognitive information refers to mental representations derived by a person from some environmental stimulus or by virtue of cognitive information derived from mental processes that operate on other mental contents. Cognitive information processing refers to the transformation of cognitive information by mental processes (Massaro, 1993).

The models of student perception that we propose are based on theories of person perception from social cognitive psychology and Weiner's attribution theory (Bierhoff, 2012; Higgins et al, 2022; Tagiuri & Petrullo, 1958; Weiner, 2013, 2018). In the central model, teaching is seen as a process of interaction with the learner designed specifically to facilitate their learning (Andrews, 2004). The facilitating effect of teaching implies an increase in the likelihood that learning will occur, as well as an increase in the likelihood that deeper learning will occur as opposed to more superficial learning (Arreola, 2007; Ryan & Deci, 2017).

The central model of student perception makes it possible to specify the relationship between students' severity in evaluating teaching and the facilitating effect of teaching that the student experiences. Student severity is defined as a measure that characterizes the student as an evaluator of teaching, such that higher values of severity are related to higher probabilities of more negative evaluations (Bond et al., 2020; Eckes, 2015; Engelhard Jr. & Wind, 2017). It also makes it possible to clearly define the relationship between the dimensions of quality in teaching and the constructs found in theoretical works to characterize the learning process.

Additionally, the model provides a theoretical and operational definition of conditions for measurement validity and conditions to define when the effect of a variable can be considered as a source of bias. The proposed models show that, under a hypothesis of validity of measures of quality in teaching, if there are differences in students' severity, these should have an inverse relationship with the facilitating effect on learning (Ames & Lau, 1979; Cáceres, 2018; Grimes et al, 2004; Wigfield et al, 1997). The attribution model applies the central model from the perspective offered by Weiner's attribution theory (Weiner, 2013, 2018).

Person Perception in Social Cognitive Psychology

Person perception is a complex process that extends over time and needs to process signals and interpret them by making a series of attributions to motives, feelings, and beliefs of other people, considering the person and the situation (Bierhoff, 2012; d'Apollonia & Abrami, 1997; Tagiuri & Petrullo, 1958).

Signal processing allows the perceiving person to infer a certain state about the object of perception. In student perception of teaching, "using examples" can be a signal of "clarity" in teaching. In these processes, there is a probabilistic relationship between signals with certain attributes ("use of examples" and "clarity of the teacher"). "Using examples" can be used when inferring different aspects or attributes of teaching, for example, in the perception of its "clarity" and "depth."

In addition, person perception is considered to involve, at the cognitive level, mental schemas that characterize people and their social situations. Schemas can be considered as cognitive categories that help to select and process information (Bierhoff, 2012). These schemas provide social prototypes, i.e., knowledge about typical people and situations (Gilovich et al., 2023). On the other hand, schemas are involved in the formation of first impressions, which constitute an organized cognitive representation of the perceiver about the perceived person (Biehoff, 2012; Hamilton et al, 2020). In person perception, therefore, the experience of the perceiver and external information about the perceived person are important, as well as the cognitive categories that are formed as part of the perception process.

Weiner's Attribution Theory

Attribution theory considers the causal attributions made by an individual to be a key aspect in explaining motivation and emotional responses (Weiner, 1985; Weiner et al., 1979). Attributions are interpretations of the perceived causes of a personal outcome. In person perception, attribution processes are fundamental (Bierhoff, 2012; Heider, 2013; Tagiuri & Petrullo, 1958; Weiner, 2013, 2018). Attribution theory focuses on explaining these processes, which leads to understanding student motivation and emotional and behavioral responses.

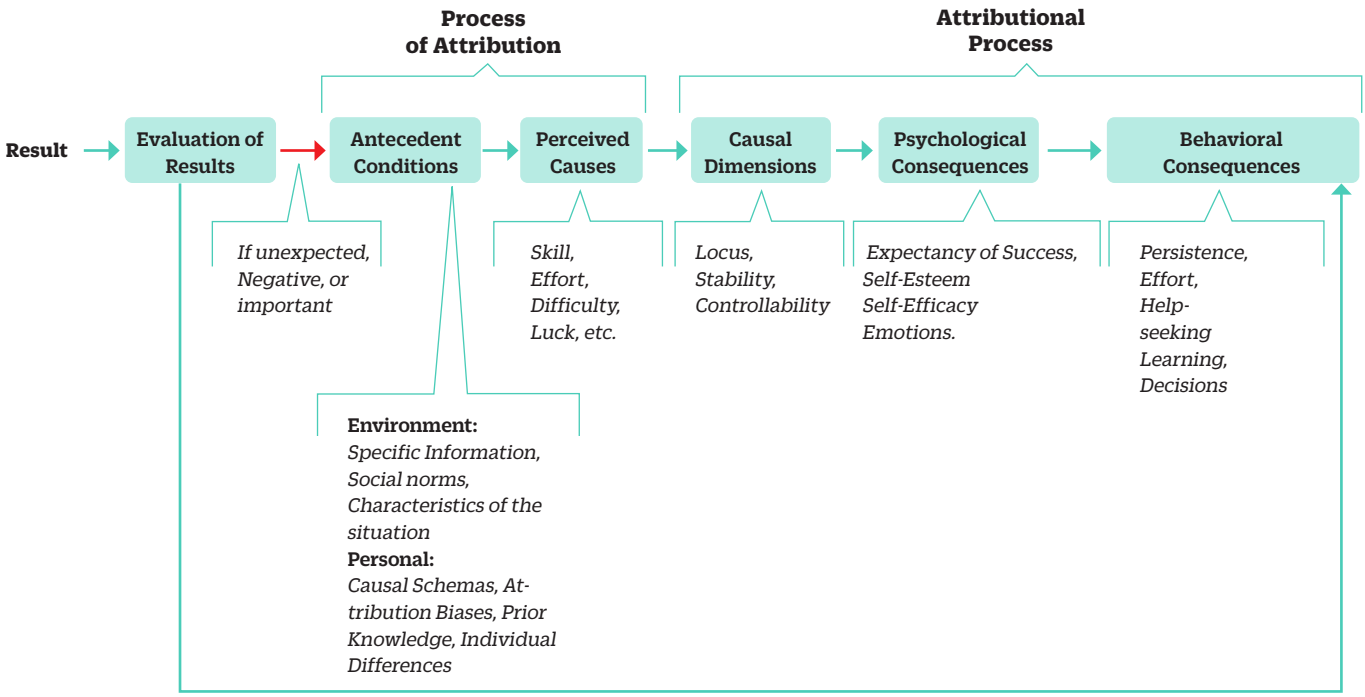
In addition, this theory considers that there are cognitive processes that mediate between antecedent stimuli and behavior (Weiner, 2013). From this perspective, there are three fundamental aspects: first, the perceived causes of an event; second, the information that relates to causal inferences; and third, the influences of causal attributions.

Like other Expectancy-Value theories of motivation, it considers that motivation is determined by what one can obtain and what the probability of obtaining it is (Schunk et al., 2014). However, in this theory, the value or incentive of the goal refers to the subjective value of the goal, which has an isomorphic or one-to-one relationship, with its emotional impact. Thus, attributions are related to the emotional impact that these goals produce in the individual. Therefore, attributions affect the consequences of achieving goals (Weiner, 1985). For example, a goal may be to pass a course exam. This goal has objective properties. However, the value of the goal for this theory refers to the meaning and consequences of achieving that goal for the person who pursues it.

On the other hand, in this theory, events do not elicit affective and behavioral responses directly, but after they have been mediated by some kind of cognitive interpretation. As in Bandura's Social Learning theory (Bandura, 1997; Grusec, 1994; Bandura & Walters, 1977), cognitive mediation is considered. Additionally, in attribution theory, the concept of expectancy is similar to that adopted in other Expectancy Value theories (Weiner, 1985). In contrast, in Bandura's Social Learning theory, a distinction is made between self-efficacy expectancy and outcome expectancy (Bandura, 1978; Schunk et al., 2014).

A distinctive aspect of the attribution theory is the emphasis on cognitive-emotional processes linked to attributions. In this theory, the process by which a person makes attributions involves several components: a first component of outcome evaluation (success or failure); a second

Figure 1.
Weiner's Attribution Theory (reworked from Weiner, 1985)



component of attribution response (attribution of the outcome to a specific cause); a third component of affective response; and a fourth component of behavioral reaction. Figure 1 summarizes the main processes, constructs, and their relationships in this theory.

The second component comprises the processing of information from various sources and represents a very complex cognitive process (Weiner, 1985). Some of the elements involved in this process are cognitive processing of information about the current situation, memory retrieval of past events, and causal schemas or relatively stable beliefs about relationships between an event and the perceived causes of that event.

In addition, when an outcome is evaluated as success or failure, a general emotional response that does not depend on the attribution is produced: a successful outcome generally produces a response of joy; on the contrary, a failure outcome produces a response of frustration and sadness. Once an attribution response has been given and the individual attributes it to some particular cause; they experience specific emotions that depend on the type of attribution made (Schunk et al., 2014; Weiner, 1985; Weiner et al., 1979).

This theory also considers that attribution responses vary across three causal dimensions: locus, stability, and controllability.

The locus dimension denotes whether the cause is perceived as internal or external to the person. The stability dimension refers to how stable a cause is perceived to be over time. The controllability dimension denotes how much the individual perceives that they have control over a cause. The specific configurations of an attribution with respect to these three dimensions produce different affective and behavioral responses (Weiner, 1985, 2012).

Thus, in a first characterization, it is possible to consider the role that each of the dimensions primarily plays: the locus dimension is related to emotions linked to esteem (Graham, 1991; Schunk et al., 2014; Weiner, 1985, 2012), such as

pride, confidence, and satisfaction; the stability dimension is related to change in the expectancy of success (Weiner, et al., 1976), as well as to emotional response, specifically in relation to experienced anxiety (Arkin & Maruyama, 1979); and the controllability dimension is related to social emotions and interpersonal judgments (Graham, 1991; Schunk et al., 2014; Weiner, 2012, 2013). Social emotions include anger, pity, guilt, and gratitude. Meanwhile, interpersonal judgments involve, for instance, decisions on helping, evaluation, and feelings.

Different probabilities of affective responses are expected from specific attribution configurations. The probability of a positive affective response is high when the attribution configuration is internal locus, controllable, and stable. An attribution that would have this configuration is the normal effort. For a successful outcome, for attributions with internal locus, a high probability of positive affective responses such as feelings of confidence, satisfaction, and pride is expected (Weiner et al., 1979).

On the other hand, a negative response such as anger in the face of a failure outcome is highly probable when the attribution configuration is external locus (Weiner et al., 1979). An example of external attribution would be the teacher. While attributing success to the teacher's help will likely produce gratitude, attributing failure to an obstacle posed by the teacher will likely produce anger (Gredler, 2009).

Similarly, different probabilities of behavioral responses are expected from specific attribution configurations (Graham, 1991; Gredler, 2009; Weiner, 1985). A key aspect in relation to behavioral responses is that the interpretation of an outcome (causal attribution) determines the type of behavioral response. One type of behavioral response that can be explained through the specific configurations of attributions is coping behavior to an adverse outcome. When a person attributes personal failure to an unstable cause, their expectancy of success is higher than when they attribute it to a cause considered stable (Weiner et al., 1976). On the other hand, anxiety is lower when failure is attributed to an unstable cause than when it is attributed to a cause considered stable (Arkin & Maruyama, 1979). Therefore, the stability dimension is key to maintaining a better expectancy of success and less anxiety when facing an adverse outcome.

Additionally, persistence improves when the attribution of low ability is changed to lack of effort (Andrews & Debus, 1978), poor strategies (Anderson, 1983), or temporary external barriers (Wilson & Linville, 1982). These changes would be, at least in part, mediated by changes in the expectancy of success related to the stability of attributions (Weiner, 1985).

Attributions to unstable and controllable causes such as effort and the use of strategies are usually accompanied by greater effort and a revision of strategies when facing a negative outcome in a task. In contrast, attributions to stable and uncontrollable causes such as ability in people with entity theory (ability is something stable that cannot be changed) in the face of a negative outcome are usually accompanied by avoidance and lack of persistence and effort (Dweck, 1986).

Another aspect of coping with an adverse outcome is help seeking (Ames & Lau, 1982; Philip et al., 1982; Wills & Paulo, 1991). Students would be more willing to seek help when they perceive that the solution to their problem is under their control and would seek the type of help that would allow them to remedy their problem and facilitate their self-sufficiency (Philip et al., 1982). Additionally, Ames & Lau (1982) distinguish between patterns of attributions relevant and irrelevant to help seeking. Attribution patterns influence the process of making the decision to seek help. Students with a relevant pattern are more likely to seek help than students with an irrelevant one. On the one hand, the relevant pattern attributes a successful outcome to ability and effort but considers that the cause of the problem is lack of effort and not having understood some concepts and principles. Likewise, these students consider that they have the necessary level of global ability. They also perceive that, if they made an adequate effort and received help, the specific comprehension deficiencies could be solved. Furthermore, they do not consider that there are external causes

for their poor performance. On the other hand, the pattern irrelevant to help-seeking would be characterized by external attributions to poor performance (difficulty, the teacher, or luck) and a lower probability of help-seeking.

Central Model of Student Perception

The central model of student perception contains fundamental assumptions about student perception that are empirically testable and seeks to provide an adequate characterization of perception and its role in the relationship between teaching, learning, and context. For its formulation, a vast literature in social cognitive psychology, social cognitive theory of motivation, and research with a cognitive focus on the students' perception and learning process was considered. Consistent with the core model, we can specify models that focus on a particular aspect. However, at the same time, it is possible to compare these specific models with each other in a systematic manner, in order to test some general principles and analyze their consistency. The assumptions that constitute the central model are outlined below:

1. The facilitating effect of teaching on learning is considered to be mediated by social cognitive variables that explain motivational processes and qualitative differences in the learning process (Ames & Lau, 1982; Anderson, 1983; Andrews & DeBus, 1978; Arkin & Maruyama, 1979; Bandura, 1989, 1991, 1993; Bandura et al., 1996; Berry, 1999; Philip et al., 1982; Cáceres, 2018; Deci & Ryan, 2000, 2008; Dweck, 1986; Graham, 1991; Gredler, 2009; Schunk, 1990; Vansteenkiste et al, 2006; Wills & DePaulo, 1991; Wilson & Linville, 1982; Zhang et al., 2022; Zimmerman, 1995, 2000).
2. The perception of teaching is cognitively mediated by social cognitive variables such as the type of attributions, self efficacy to learn, outcome expectancy, intrinsic motivation, perceived self determination, types of goals, and self theories of intelligence (Ames & Lau, 1979; Cáceres, 2018; Graham, 1991; Grimes et al, 2004; Svanum & Aigner, 2011; Wigfield et al, 1997; Zhang et al., 2022). That is, aspects such as the interpretation of signals used in the perception of teaching depend not only on the perceived signals but also on cognitive interpretation processes involving these variables.
3. Differences in the facilitating effect of teaching on the learning process explain differences in student perception of teaching (Cáceres, 2018).
4. From items 1 to 3, under the hypothesis of validity of measures of teaching efficacy and facilitating effect, we expect student severity in evaluating teaching to have a negative correlation with the facilitating effect experienced by a student (Ames & Lau, 1979; Cáceres, 2018; Grimes et al, 2004; Wigfield et al, 1997).
5. Regardless of the theoretical perspective adopted, if the facilitating effect of teaching is appropriately defined from a social cognitive theory of motivation, and student severity is adequately defined under the hypothesis of validity of the measures considered, the pattern described in point 4 is expected (Cáceres, 2018).
6. Student perception incorporates mental representations that allow establishing a probabilistic relationship between the perceived signals of teaching and the occurrence of certain features of this (Bailey et al., 2000; Bierhoff, 2012; Browne & Gillis, 1982; Cáceres, 2018; d'Apollonia & Abrami, 1997; DeBerg & Wilson, 1990; Jusling & Montgomery, 2007; Pfeiffer et al., 1977; Tagiuri & Petrullo, 1958).
7. Students' perceptions of teacher-delivered instruction involve mental presentations related to implicit theories about the dimensions of instruction and how they relate to each other (Cadwell & Jenkins, 1985; Kishor, 1995; Landy & Farr, 1980; Marsh, 1987; Renaud & Murray, 2005; Shweder et al., 1980; Whitely et al., 1976). Students' implicit theories refer to a relational schema or knowledge structure about the relationship between different dimensions of teaching. Students' implicit theories describe how they believe they

associate the different dimensions of teaching quality.

8. In the perception of teaching, a process of cognitive organization that leads to the formation of a general impression of the teacher takes place, involving prototypes, schemas of people, roles, and events (Begrich et al., 2020; Begrich et al., 2021; Clayson, 2013; Cooper, 1981; d'Apollonia & Abrami, 1997; DeNisi et al., 1984; DeNisi et al., 2013; Feldman, 1981; Fisk et al., 2020; Marder et al., 2020; Merritt, 2008; Nathan & Lord, 1983; Renström et al, 2021). General impressions play a role in cognitive information processing once formed and persist over time. However, if subsequent information is evaluated by the student as inconsistent with the first overall impression, it is possible that this may be changed to achieve a consistent overall impression of the teacher.

The proposed model explains students' perception of the teaching and learning process. It explains how it can provide information about the effectiveness of teaching and the mechanisms that can introduce biases in perceptions. Using the model, it is possible to define the conditions under which student evaluations, although subjective, can be dependable and informative, adequately reflecting the effectiveness of teaching and its facilitating effect.

The validity hypothesis specifies the relationships between the constructs articulated by the model so that the students' perceptions can be dependable and informative. In this sense, when reference is made to the "validity hypothesis," it is prescriptive, defining the conditions that should be met to obtain valid measures.

The discussion of attribution theory is related to point (1) on how the facilitating effect is mediated by causal attributions and also to point (2) on how causal attributions cognitively mediate the perception of teaching. Additional arguments are then presented by means of an attribution analysis. In the discussion that follows in this section, we will mainly illustrate the attribution analysis related to points (1) to (4).

The first example is related to students' evaluation of the help received by the teacher. Depending in part on the attribution pattern, students may value the help offered as useful to overcome the problems they face in a course, or they may consider it unhelpful. Specifically, students with an attributional pattern relevant to help-seeking may value the teaching received as more useful and valuable for their learning. In turn, these students, who would choose to seek help, would likely feel gratitude toward the teacher. Consequently, the subjective evaluation of teacher-provided help in the course would be more positive for students with a relevant attribution pattern for help than that of students with a non-relevant one.

Similarly, the type of attribution pattern is related to the subjective value attributed to tasks and activities proposed in a course. For example, students who attribute the causes of their performance on the task to internal locus, unstable, and controllable causes, such as effort and use of strategies, may experience emotions of pride, confidence, competence, and satisfaction when they perform the task successfully. In contrast, students who attribute the causes of task performance to external, stable, and uncontrollable causes, such as the ease of the task, would not experience these positive effects. On the other hand, in the case of failure, students with internal locus, unstable, and controllable attribution would continue to exert effort, persist more on the task, and revise their strategies.

On the contrary, students with an external, stable, and uncontrollable configuration, when faced with failure, respond with low persistence and effort, and adopt avoidance behavior. In addition, they probably experience greater anxiety, embarrassment, lack of confidence, and feelings of incompetence than individuals with an internal, unstable, and controllable configuration. Therefore, the internal locus, unstable, and controllable attribution configuration would be associated with a more positive subjective assessment of the tasks and activities proposed in a course than students with the external locus, stable, and uncontrollable configuration.

Another example refers to how causal attributions would affect the subjective

assessment of the signals linked to the teacher's clarity. Let us compare how the difference in the subjective assessment of the teacher's clarity would be between, on the one hand, an attribution of understanding to the student's prior knowledge, effort, attention, and intention to understand (attribution pattern I), and, on the other hand, an attribution of understanding to the teacher's style of communication and organization of the content presented, as well as to the difficulty of the content selected (attribution pattern II).

In the case that students with attributional pattern I evaluate their understanding as poor, they would attribute their lack of understanding to themselves, but with an adaptive response with respect to the understanding problem they experienced. In this case, students with attributional pattern I would respond by reinforcing their previous knowledge, increasing their effort, attention, and intention to understand. In turn, a logical consequence of their attribution pattern would be that they would not see the teacher as the main cause of their lack of understanding.

On the contrary, students with attribution pattern II, when faced with a similar comprehension problem, would attribute their lack of comprehension to the communication and organization style of the teacher and to an excessive difficulty of the content selected by the latter. In addition, since attribution pattern II corresponds to an external, stable, and uncontrollable configuration, anger or rage towards the teacher could probably be expected, who would represent an external obstacle to comprehension, which is also under the teacher's control.

Additionally, because attributional pattern I corresponds to an internal, unstable, and controllable configuration, students with this configuration present a more adaptive response and a more positive affective response than students with attribution pattern II. For example, students with attribution pattern II, who experience comprehension problems, are likely to exhibit anxiety, helplessness, lack of persistence and effort, and avoidance behaviors. On the contrary, this type of response is not expected in students with attribution pattern I. Consequently, based on the considerations made on the subjective evaluation of the teacher's clarity, a more positive evaluation is expected from students with attribution pattern I than from those with attribution pattern II.

The analyses of these examples suggest that attribution patterns explain differences in the cognitive interpretation of the signals used to assess teaching. Moreover, together with all the previous theoretical discussion, they help to clarify that the arguments considered based on attribution theory are consistent with the assumptions of the central model. Thus, attribution patterns for different specific causes explain differences in the student's perception of teaching. Similarly, attributions to causes with different configurations in the causal dimensions can also explain differences in student perception.

Attribution Model of Student Perception

Based on the previously stated assumptions and the attribution analysis performed, we expect that the type of attributions made by the students explain differences in student perception of teaching. In particular, if we analyze the process of answering SET questionnaires, considering the cognitive and social cognitive processes and the mental structures involved in person perception, we expect that the configuration of the perceived causal dimensions explains differences in the process of answering SET questionnaires.

One aspect of the student response process is severity. The latter is related to the tendency to evaluate the quality of teaching more negatively. A corollary of the assumptions of our theoretical model is that the pattern of attributions to specific causes and the configuration in perceived causal dimensions are severity factors. An empirical assessment of the validity of the assumptions of our model would be possible by measuring student severity and analyzing whether the attribution pattern explains differences in severity.

If we also introduce a hypothesis of SET validity, there should be a negative relationship between severity and the quality of the learning process in the context of a course. Thus, students who benefit more from teaching and experience

a better learning process would be expected to be less harsh than students experiencing a less positive effect from teaching and a lower quality learning process.

Thus, while it is expected that there will be differences in the assessment made by each student, these do not necessarily constitute assessment biases. Rather, they represent differences in assessment that reflect differences in the facilitating effect of teaching on learning.

Note that the SET validity hypothesis is more restrictive than the theoretical assumption (2), which proposes a cognitive mediation role of social cognitive variables in student perception of teaching. For example, if a student experiences intrinsic motivation in performing a task proposed by the teacher rather than extrinsic motivation, this would explain differences in how the student perceives the teacher's teaching. Thus, the central model allows explaining at the cognitive level differences among students in perception that do not necessarily reflect differences in the quality of the teaching and learning process in the context of a course. For example, if the student's implicit theories about how teaching dimensions covary have poor agreement with how they are actually associated with teachers, this may introduce biases or illusory relationships in the student's perception [see theoretical assumption (7)]. This is one way in which student perception may not reflect differences in the quality of the teaching and learning process; these are cases where the student has a distorted or biased perception of what aspects of teaching have to occur together, such as the clarity, depth, or enthusiasm of the teacher.

The previous discussion can be completed with the proposal of an attribution model for student perception of teaching. A first observation is that the relevance of causal dimensions in cognitive information processing is plausible when analyzing the attribution process and the perception of antecedent causes (Frieze & Weiner, 1971; Meyer, 1978, 1980; Weiner, 2013). According to attribution theory, the mental representation of attribution to a specific cause is based, in part, on causal dimensions. Therefore, causal dimensions may not only be useful in explaining the consequences of attributions, but they are also involved in the processing of cognitive information. The mental representation of a specific cause, at least in part, would correspond to a certain configuration of causality dimensions. The above considerations support the first premise of the attribution model: causal dimensions play a role in cognitive information processing in student perception of teaching.

A second premise of the proposed model is that the configurations of the causal dimensions are part of the individual's mental representations involved in the assessment of the quality of teaching. The results obtained by Ames & Lau (1979) are compatible with this second premise. Ames & Lau (1979) found that students who consider internal causes to be of greater importance evaluate more positively, while students who consider external causes to be of greater importance do so more negatively.

Additionally, the model assumes (third assumption) that the evaluation of teaching quality is based, in part, on the comparison between the configuration of the causal dimensions with good teaching quality and the configuration inferred by the individual in relation to a teacher's teaching in a course. If the latter configuration has a significant discrepancy with the former, this would be related to a student's harsher assessment of the quality of teaching.

In terms of the configuration of causal dimensions, attribution pattern I (internal locus, unstable, and controllable) is considered to be related to a perception of higher quality of teaching, while attribution pattern II (external locus, stable, and uncontrollable) is expected to be associated with a perception of lower quality. In turn, students with attribution pattern I would be less harsh than those with attribution pattern II.

Attribution patterns I and II may correspond to different patterns of attribution to specific causes as illustrated in Table 1. Thus, individuals with attribution patterns I or II may correspond to different combinations of specific causes. For example, students who consider effort as the most important cause would have an attribution pattern I, but those who perceive that the main causes for their learning and performance are

Table 1.
Relationship Between Attribution Patterns, Characteristic Values of Causal Dimensions, and Specific Causes

Type of attribution pattern	Locus	Stability	Controllability
Pattern I	*internal (effort, strategies, intention, ability)*	*unstable (effort, strategies, intention)*	*controllable (effort, strategies, intention)*
Pattern II	*external (difficulty, luck, teacher)*	*stable (difficulty, ability, teacher)*	*uncontrollable (luck, teacher, ability)*

the use of strategies may also have an attribution pattern I and a configuration of the causal dimensions similar to the previous example.

However, it should be kept in mind that a specific cause may be perceived by different individuals as differing in locus, stability, and controllability. For example, some people are capable of sustaining high effort over time. In this case, effort for these individuals could be perceived as relatively stable, and not unstable, as classified in Table 1. In addition, some learning outcome oriented individuals believe that ability can be improved through effort, the pursuit of challenges, and persistence. For these individuals, ability would be perceived as relatively unstable.

Discussion

There is evidence to suggest that several of the constructs considered in social cognitive theories of motivation can explain differences in students' severity when evaluating teaching, which are consistent with our central model. Svanum & Aigner (2011) found that students with intrinsic goals evaluate teaching more positively than those with extrinsic goals.

Ames & Lau (1979) found that students with internal locus of causality evaluate more positively than those with an external one. Gotlieb (2013) obtained results suggesting that teachers with characteristics that make them more effective may favor attributions with internal locus of causality and obtain more positive student evaluations (lower severity). A similar result was found by Grimes et al. (2004) with locus of control: students with an internal one evaluate more positively than students with an external one.

Additionally, Wigfield et al. (1997) found results in agreement with a positive relationship between self-efficacy and the perception of the value, usefulness, importance, and interest of teaching. That is, they found that greater self efficacy was associated with a more positive perception of teaching (less severity).

More recently, Cáceres (2018) found that the variables self-efficacy to learn, outcome expectancy, intrinsic motivation, perception of choice, type of goal choice, locus of causality, and stability and controllability of causal attributions influence students' severity when evaluating teaching.

The aforementioned studies provide evidence that the social cognitive variables seen can explain differences in students' severity. In turn, these variables are related to the probability of learning occurring and its quality in a way that aligns with our models. Moreover, the direction of the observed effects is consistent with that proposed by both models. Thus, based on the

aforementioned evidence and the proposed models, if we appropriately define the facilitating effect of teaching and student severity and obtain valid measures of these constructs, we expect a negative relationship between student severity and the facilitating effect they experience. This relationship between student severity and facilitating effect is key. If this pattern is not observed, the central model explains what possible sources of perception biases may be operating in the specific conditions in which they occur. The model also explains what the possible cognitive-level mechanisms of these biases are.

On the other hand, when looking at the relationships between social cognitive variables, we find that these are consistent with our models in relation to predictions about students' expected severity when evaluating teaching. For example, the relationships between mental configurations and attribution patterns with the adoption of different goal content (Bandura, 1991, 1993; Wood & Bandura, 1989; Ryan & Deci, 2017) are also consistent with the proposed models. If the facilitating effect of teaching is appropriately defined based on a social cognitive theory of motivation, and student harshness is appropriately defined under the hypothesis of validity of the measures considered, the pattern described in item 4 (central model) is expected.

From the above arguments, a first conclusion is that the proposed models offer a coherent picture of student perception, which, in turn, is in line with results found in several previous studies. Thus, the models offer a good basis for the development of a social cognitive theory of student perception, which helps to understand its role in the relationship between teaching, learning, and context.

Also, the models provide a general overview of how various constructs mediate the cognitive interpretation of the signals used to evaluate teaching and how differences occur among students on how teaching facilitates their learning. Additionally, the models presented provide guidance in understanding how the facilitating effect of teaching and differences in student severity are associated with differences at the cognitive, affective-emotional, and behavioral levels.

Furthermore, these models help to understand situations where the differences observed among students when evaluating teaching are strictly biases, or alternatively, reflect differences in the facilitating effect of teaching in relation to the students' learning process. Therefore, a second conclusion from these arguments is that the proposed models provide a useful theoretical framework for the study of the construct validity of SET questionnaires based on the theoretical and empirical study of the students' response process when evaluating teaching from a cognitive and social cognitive perspective.

On the other hand, teaching oriented, rather than student- and learning oriented quality assessment practices—which are more consistent with current trends in teaching—currently predominate (Doyle, 2011; Goodman, 2016; Richlin, 2006); Theall et al, 2001; Weimer, 2013; Wright, 2011). The models proposed here can be applied to implement an evaluation of the quality of teaching centered on students and their learning. This can be implemented by measuring the effect of teaching on the students' learning process by measuring the effect on the constructs considered in these models (Cáceres, 2018).

In addition, these models provide a detailed perspective on student perception and its role in the teaching and learning processes. At the same time, they provide a rich conceptual framework to guide instrument development, validity research, and the influence of context on student perception. They also help to understand the relationship between teaching, its facilitating effect, and the learning process. Thus, a third conclusion is that these models offer a valuable conceptual framework for formative quality assessment practices in teaching and learning.

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