

# Development and validation of the Team Learning Questionnaire

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**Abstract.** Nowadays the organizational scenario is changing in several aspects that affect organization commitment. Team learning construct has emerged as a tool to deal with these changes and the dynamic nature of this situation. Although team learning has acquired importance in recent years, instruments to measure team learning should be developed. The aim of this paper is to develop and validate a team learning scale, the Team Learning Questionnaire, attending to four dimensions of team learning: Continued Improvement Seeking, Dialogue Promotion and Open Communication, Collaborative Learning, and Strategic and Proactive Leadership that Promote Learning. Results provide evidence of the reliability and validity of the scale.

*Key words:* Team learning, team learning questionnaire, team learning dimensions.

## Introduction

Teams are considered basic and strategic units in achieving organizational excellence (Guzzo, 1996; Kasl, Marsick & Dechant, 1997; King & Rowe, 1999; Senge, 1990; Van Offenbeek, 2001;

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Yeo, 2003). An organization learns through actions and interactions that take place between people who are typically situated within smaller groups or teams (Edmonson, 2002). Through these teams making appropriate changes in how they do their work, an organization maintains its effectiveness in a changing world. In this sense, team learning is seen as a potential resource for the organization in maintaining high levels of competitiveness in this complex and changing environment (Edmonson, 2002; McDougall & Beattie, 1995; Van Offenbeek, 2001; Yeo, 2002).

A decade ago, Senge (1990) suggested that teams are the fundamental learning unit in an organization. However, although much has been written about teams and about learning in organizations, our understanding of learning in teams remains limited (Edmonson, 1999). We agree with Edmonson (2002, p. 129) that “the implications of Senge’s (1990) proposition that teams are the unit of organizational learning have remained largely undeveloped, with limited empirical research on team learning in real organizations”.

In this sense, the development of instruments to measure team learning becomes an urgent task if we want to contribute to better understanding of this phenomenon. Therefore, the main purpose of our study is to develop and validate a questionnaire to measure team learning that can be used in future empirical research to advance the knowledge about the antecedents and consequences of this relevant concept. This will be the main contribution of our study.

### *Team learning definitions*

Due to the scarce empirical research, a widely accepted definition of team learning has not yet been developed. However, several definitions have already been provided. The earliest definition we found is the one by Kasl et al. (1997), who define team learning as a “process through which a group creates knowledge for its members, for itself as a system, and for others” (p. 229). This definition emphasizes the process of knowledge generation within the group. From a recognizable systemic approach to groups, the authors emphasize that: (1) the group is the creator of knowledge, and (2) that this knowledge can benefit the individual team members (micro-system), the group itself (system) and other different systems or even the wider organization (macro-system).

Later, Edmonson (1999, 351) defines team learning as the “activities carried out by team members through which a team obtains and processes data that allow it to adapt and improve” (p. 351). This definition emphasizes the goals of adaptation and improvement, and the relevance of data management in achieving them. In the same paper, the author provides a second definition that specifies the kinds of activities that the team will carry out to adapt and improve. This definition also contributes to clarifying what the author meant by “obtaining and processing data”. Thus, team learning is defined as “an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results and discussing errors or unexpected outcomes of actions” (p. 353). Edmonson’s (1999) paper clearly contributes to a better understanding of the team learning concept, as the author provides several examples of what is done by the teams that learn.

A third definition is given by Van Offenbeek (2001). She proposes a model to understand team learning inspired in information processing theory and, more specifically, Huber’s (1991) conceptua-

lization of organizational learning. For Huber, learning can be conceived of as a change in the range of an entity's potential behaviours through the processing of information, which embraces four different learning activities; information acquisition, information distribution, information interpretation and information storage and retrieval. According to this framework, Van Offenbeek defines team learning as "an iterative team process in which information is (1) acquired, (2) distributed, (3) both convergently and divergently interpreted, and (4) stored and retrieved, leading to a change in the range of a team's potential behaviours" (p. 305). In Van Offenbeek's definition, as in Huber's model, two important perspectives on learning are combined: the structural and the interpretative systems. Within the structural perspective, logistic activities like data gathering and processing are essential in learning processes; within the interpretative perspective, the emphasis is on reducing errors to such a level that a course for action can be defined. Daft and Huber (1987) argued that in order for a human, a group or an organization to learn, both logistic and interpretative problems must be solved. However, Van Offenbeek's view of *information interpretation* differs from Huber's. In Huber's information processing model, the interpretative aspect is confined to one activity, interpretation of given data, and it leaves out more creative aspects of learning (Huysman, 1996), such as openness to seemingly irrelevant information. In their case studies, Kasl *et al.* (1997) recognized the relevance not only of the initial interpretation of an issue ("framing"), but also of the process of transforming that interpretation into a new understanding ("reframing"). Van Offenbeek's view of interpretation activities embraces both converging interpreting activities leading to collective interpretations and diverging interpreting activities leading to wondering, seeing things anew, coming back to forgotten material, etcetera. Thus Van Offenbeek's conceptualization of interpretation comes close to Weick's (e.g., 1996) concept of sense-making, which also includes the active invention that precedes interpretation.

Finally, Ellis, Hollenbeck, Ilgen, Porter, West and Moon (2003, 822) define team learning as "a relatively permanent change in the team's collective level of knowledge and skill produced by the shared experience of the team members". As the authors explain, this definition expands on traditional conceptualizations of the learning process at the individual level (e.g., Weiss, 1990) by recognizing that, in team contexts, people can learn not just from their own direct experience, but also from the experience of other team members.

### *Team learning questionnaires*

A shortage of empirical studies on team learning has been observed. Likewise, there is an important lack of quantitative and field research with natural work teams (see Edmonson, 1999, for an exception). Related to this point, the need to adopt designs in which measures of the learning process are established in advance – i.e., questionnaires – has also been pointed out (Daft & Huber, 1987; Robey, Boudreau, & Rose, 2000, Van Offenbeek, 2001).

However, not many questionnaires evaluate team learning. Only four questionnaires about team learning were found. Two of them do not focus on learning activities or behaviours. Dechant and Marsick's (1993) instrument measures conditions for team learning rather than activities within the

learning process itself, while the instrument by Crossan and Hurland (see Crossan, Lane, & White, 1999) is more directed towards learning outcomes.

The two other instruments also have important drawbacks. Edmonson (1999) developed a unidimensional seven-item scale with an internal consistency of .78. This scale is much too short to capture the complexity of team learning, and it does not present information about different dimensions of team learning. For instance, a team could be very good at promoting dialogue and open communication as a way to develop team learning, but not as good at analyzing past data (e.g., mistakes, non-compliance, underperformance...) to improve for the future.

Finally, Van Offenbeek's (2001) instrument, although it distinguishes several dimensions, does not have good enough psychometric properties. The factorial structure did not fit the theoretical model (one of the initial five dimensions was deleted), and internal consistencies for most of the sub-scales were under .70.

### *The aim*

The development of instruments to measure team learning becomes an urgent task if we want to contribute to better understanding of this phenomenon. In our view, the lack of a good instrument limits the development of more empirical research on this important topic, and would explain why we know so little about team learning, even though it was pointed out almost forty years ago as the fundamental learning unit in an organization (Senge, 1970).

In this paper, we will contribute to previous research by developing and validating a questionnaire to measure team learning. New instruments should have the following characteristics: (1) they should be based on a theoretical framework, (2) they should be long enough to capture the complexity of the topic, (3) they should distinguish different dimensions of team learning, (4) they should emphasize the activities or behaviours that are carried out by teams that learn as an ongoing process, and (5) they should have good psychometric properties. In the next section, we develop the theoretical framework on which our questionnaire is based.

### *The four-dimensional model of team learning*

In this paper, team learning is defined as the set of behaviours and activities carried out by a team on a regular basis that enhance the acquisition and development of competencies (e.g., knowledge, skills, attitudes...) and a better functioning over time. Several comments must be made in order to better understand the definition.

First, the emphasis in our model is intentionally on behaviours. We are interested in describing the sorts of things that teams that learn are supposed to do. This is a pragmatic approach that should be useful in orienting teams and team leaders about the kinds of behaviours they should carry out in order to learn and to improve their functioning over time. This is a worthwhile goal, as team learning is seen as a potential organizational resource for maintaining high levels of competitiveness in this complex and changing environment (Edmonson, 2002; McDougall & Beattie, 1995; Van Offenbeek, 2001; Yeo, 2002).

Second, these behaviours are not exhibited only in specific situations (i.e., when managing crises). On the contrary, ‘on a regular basis’ means that these behaviours form a part of their usual way of operating. Teams that learn have integrated these behaviours into their daily activities and functioning. Paraphrasing the traditional definition of organizational culture, these behaviours are part of “the way these teams do things”.

Third, the main and most common characteristic of these regular behaviours and activities is that they promote learning. The acquisition and development of competencies takes place when teams behave in this way. Competencies have been proposed as the generic term to include knowledge, skills, attitudes and any other possible object of learning.

Fourth, as a consequence of learning and of the acquisition and development of competencies, improvement in team functioning will occur.

In our model, the set of behaviours and activities carried out by teams that learn is grouped into four dimensions: (1) Continuous Improvement Seeking, (2) Dialogue Promotion and Open Communication, (3) Collaborative Learning and (4) Strategic and Proactive Leadership Promoting Team Development. Let us examine each of them.

*Continuous Improvement Seeking* refers to the extent to which the team learns from past experiences. Some experiences are very significant in producing learning. Mistakes are especially relevant. They are never desirable, and even less so in a team that is searching for excellence. But mistakes happen. Within teams that learn, mistakes are seen as learning opportunities for the future. Once the mistake takes place, teams work on it in order to keep it from happening again in the future. Mistakes are analyzed critically. A suitable mistake management avoids attributing guilt, while at the same time, trying to clarify the causes and, mainly, trying to create the conditions where it will not occur again in the future. It is also very important for all the team members to have access to the lessons learned. Appropriate mistake management does not search for a guilty party – as this would lead to wrong practices, such as not reporting mistakes or trying not to appear responsible for mistakes. Nor is it an appropriate practice to ignore mistakes, and miss the opportunity to carry out an analysis that clarifies the causes and establishes the conditions to avoid making the same mistakes in the future.

Another significant learning experience is performance analysis (e.g., under-fulfilment of objectives). So that learning takes place, the focus is very similar to that of mistake management. A lot can be learned from analyzing the reasons why a specific performance (of an individual team member or of the whole team) over a time period (e.g., annual) has been poor or lower than expected. Action plans must be established in order to ensure that performance will improve in the future. A lot can also be learned from excellent performances (e.g., why them?), and from comparing the excellent ones with poorer performances (e.g., what different conditions were present?). But learning based on performance analysis requires some previous conditions, such as goal-setting and performance appraisal systems.

To sum up, teams that learn have a strong willingness to learn from past experiences and great interest in taking actions that allow them to continuously improve.

*Dialogue Promotion and Open Communication* refers to the degree in which open and honest communication is encouraged and takes place within the team. Open and honest communication between the leader and the other members, and among all of them, is extremely relevant to the following issues:

- Reporting problems, difficulties or obstacles that one or more team members may be having in performing their tasks and whose elimination would be essential for a positive outcome of these tasks.
- Reporting deficiencies in their own performance or other team members' performance.
- Not hiding mistakes when they happen.
- Recognizing in front of the rest of the team their own lack of knowledge about different topics, or about how some tasks must be done.
- Asking about all those issues that may not be clear enough for one or more team members.
- Favouring the exchange of different opinions and points of view that can lead to better team decisions.
- Freely expressing one's opinion during team meetings, even if it differs from the majority's point of view, or from that expressed by the boss, the team leader or other more tenured team members.
- Avoiding group thinking.

In short, promoting dialogue and open communication is another relevant dimension of team learning for the reasons mentioned above.

*Collaborative Learning* refers to the degree to which team members are seen and used as sources of knowledge for the rest of the team. When a team thinks it can learn a lot from the different team members, then team work is stimulated as a way of learning from each other. In meetings and decision-making processes, discussions are promoted. The team tries to share the different members' knowledge and take all opinions into consideration before making a decision.

*Strategic and Proactive Leadership Promoting Team Development.* Last, but not least, the team leader has a huge responsibility in promoting team learning. In addition to promoting all the aforementioned behaviours, (continuous improvement seeking, open communication and collaborative learning), teams that learn should have leaders who think strategically and proactively about the development of their members. For these leaders, learning is not something that simply happens naturally as the years go by, but rather something that must be sought out actively. They worry about the development and learning of their team. They are strongly convinced that this development is fundamental to becoming and remaining competitive. They are going to use a lot of strategies to develop their teams. Training is only one of them. Learning teams' leaders are future-oriented. They anticipate the competencies that their team will need to cope with the future, and they prepare their team for that future, stimulating the development of these competencies. These leaders use a large number of strategies to enhance team learning (training, on the job training, assignment of new tasks, teamwork, performance feedback, coaching, mentoring, tutoring, behaviour modelling through benchmarking, giving more job autonomy, job rotation...).

Based on this theoretical framework, we developed a questionnaire to evaluate team learning. The next section explains how it was developed and the process followed for its validation.

## **Method**

### *Data collection*

Our sample was composed of 566 workers from one nuclear power plant. Data were collected in 2008. The total size of the company was 760 employees. Thus, we obtained a satisfactory response rate of 74.47%.

Demographic variables are described. Age is distributed: 1.5% are younger than 30 years old, 25.6% are between 30 and 45 years of age, and 72.9% are older than 45 years of age. Regarding their education, 40.5% have university studies.

The scale was administered in their workplace as part of a broader battery of questionnaires designed to evaluate safety culture. The entire battery takes about 30 minutes to be filled in. The participation was voluntary and occurred during work time. Anonymity and confidentiality were guaranteed. Several researchers went to the workplace and stayed there for about two or three days to collect data. In all sessions, the researchers explained the objective of our research and some aspects of the questionnaire to be taken into account in their responses. While the participants were answering the questionnaire, the researchers were there with them to solve any problems or answer any questions they might have.

### *Instrument development*

The instrument that is proposed in this paper is called the Team Learning Questionnaire (TLQ). We generated a pool of items capitalizing on: (a) our perusal of conceptualizations, statements and suggestions that the literature has to offer on team learning (e.g., Edmonson, 1999; Edmonson, 2002; Ellis *et al.*, 2003; Kasl *et al.*, 1997; Van Offenbeek, 2001) and the integration of this literature into our own theoretical framework explained above; (b) other questionnaires about team learning and organizational learning (e.g., Edmonson, 1999; Van Offenbeek, 2001; Yang, Watkins & Marsick, 2004); and (c) observations emanating from our organizational consulting experience on team development. Twenty items were generated for the initial pool, about which the authors of the present article reached a consensus as to their clarity, appropriateness and content validity. These items include different aspects related to the four theoretical dimensions of team learning explained in our model, that is, continuous improvement seeking, dialogue promotion and open communication, collaborative learning and strategic and proactive leadership promoting team development. This questionnaire has a 5-point Likert scale from “never or almost never” to “always or almost always”. The full list of items, the dimensions of which they form a part, and the means, standard deviations and item-total correlations are presented in Table 1.

Table 1  
*Items, Means, Standard Deviations and Item-Total Correlations*

Item	Dimension	M	SD	Item-Total r	Alpha if item is deleted
a. Mistakes are openly discussed in order to learn from them.	I	3.58	1.01	0.75	0.83
b. Differences between real and expected performance are critically and constructively analyzed.	I	3.13	1.05	0.74	0.83
c. The lessons learned are made available to all the members.	I	3.46	1.11	0.77	0.83
d. Actions are taken to continuously improve.	I	3.63	0.99	0.79	0.83
e. Even when an error is caught in time, people are still told about it, so it doesn't happen again.	I	3.69	1.03	0.7	0.84
f. When a problem occurs, there is a search for someone to blame instead of "lessons to be learned".	I	2.58	1.21	0.4	0.88
g. The same mistakes are made over and over again.	I	2.27	0.9	0.39	0.87
h. Different points of view are expressed openly and sincerely.	II	3.5	1.04	0.75	0.81
i. People are encouraged to ask "why", regardless of their rank.	II	3.26	1.1	0.81	0.8
j. The points of view of others are listened to.	II	3.42	1.02	0.8	0.8
k. "Two-way" communication (boss-subordinate and subordinate-boss) is frequently used.	II	3.43	1.08	0.72	0.82
l. We question each other when we think the work can be done better.	II	3.15	0.97	0.35	0.9
m. We learn from each other.	III	3.62	0.92	0.7	0.88
n. Knowledge is shared among the different team members.	III	3.64	0.98	0.79	0.84
o. Teamwork is encouraged as a way of learning from others.	III	3.48	1.04	0.8	0.84
p. In group discussions, everyone's opinion is taken into consideration.	III	3.46	1.08	0.73	0.86
q. Our boss supports and encourages any requests for training and learning.	IV	3.59	1.09	0.77	0.9
r. Our boss continuously looks for learning opportunities for him/herself or any team member.	IV	3.44	1.06	0.82	0.88
s. Our boss uses different strategies to encourage team members to acquire new knowledge (e.g., assigning new tasks, sharing tasks...).	IV	3.13	1.08	0.81	0.88
t. Our boss tries to anticipate what knowledge we are going to need to acquire in order to do our jobs in the future.	IV	3.11	1.1	0.81	0.88



### *Item selection*

During this phase, our objective was to select the final items that would compose the TLQ. The selection was based on two different criteria. First, we followed the item-total correlation index, based on Kumar and Beyerlein (1991), who defined a range from 0.55 to 0.81. Second, we took into account the reliability index if we deleted that item. As we can see in Table 1, the majority of the items satisfy both criteria. Only three items were deleted: f (Item-Total Correlation: 0.4; Alpha if item is deleted: 0.84), g (Item-Total Correlation: 0.39; Alpha if item is deleted: 0.87) and l (Item-Total Correlation: 0.35; Alpha if item is deleted: 0.90). In selecting the items that will make up the scale, we finally have 17 items that satisfy the criteria.

### *Reliability, factorial structure and validity analyses*

In a second phase of this study, we need to explore the psychometric properties of the scale. The objective of the data analysis is to examine the instrument's reliability, its structure, and the construct validity of our proposed four dimensions of team learning.

To measure the instrument reliability, we followed the Cronbach model on internal consistency. This model assumes that all items on a scale are homogeneous and measure the same characteristic. Also, the internal consistency can be evaluated through the correlations among all its elements.

Construct validity makes reference to the extent to which one instrument is measuring exactly what we want measure. To examine factorial structure and construct validity, we have performed a Confirmatory Factor Analysis (CFA) using the LISREL 8.30 program. In this way, we can test whether the proposed dimensions are adequately associated with the different factors of team learning, and whether they explain the team learning construct.

## **Results**

### *Internal consistency*

Descriptive analyses were computed. Means, standard deviations and bivariated correlations are provided in Table 2. As we can see in this table, all alpha Coefficients in the different dimensions of team learning are good.

As we can see in Table 2, all the team learning facets are correlated between each other, positively and significantly. In all cases, the correlations are higher than .69. These correlations indicate that the four proposed dimensions of team learning are related to each other.

Table 2  
*Alpha Coefficients, Descriptive Statistics and Correlations among the Study Variables*

	<i>M</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
1. Continued improvement philosophy.	3.32	.77	(.91)			
2. Dialogue promotion and open communication	3.16	.84	.74**	(.90)		
3. Collaborative Learning	3.38	.87	.74**	.75**	(.89)	
4. Strategic and Proactive leadership that promote learning	3.15	.97	.72**	.72**	.69**	(.91)

*Factorial structure and construct validity*

To examine construct validity and confirm our proposed four-factor structure to explain team learning, we performed a Confirmatory Factor Analysis, using LISREL 8.30. Two separate CFA procedures were carried out to test these possibilities: a) a single-factor model, in which all items (team learning) load into a single factor, and b) an alternative model, in which items load into four different factors (four dimensions of team learning). Maximum likelihood estimation methods were used, and the input for each analysis was the covariance matrix of the items. The absolute goodness-of-fit of the models was evaluated using absolute and relative indices. The absolute goodness-of-fit indices computed were: the Root Mean Square Error of Approximation (RMSEA); the goodness-of-fit index (GFI); and the adjusted goodness-of-fit index (AGFI). The relative goodness-of-fit indices calculated were: the Normed Fit Index (NFI); the Non-Normed Fit Index (NNFI); and the Comparative Fit Index (CFI).

The results of the Confirmatory Factor Analysis are shown in Table 3.

Goodness indexes in the single-factor model are:  $\chi^2 (3.98) = 538.34, p < 0.01$ ; Root Mean Square Error of Approximation (RMSEA) = 0.075; 90 Percent Confidence Interval for RMSEA: 0.063; 0.089; Normed Fit Index (NFI) = 0.96; Non-Normed Fit Index (NNFI): 0.97; Comparative Fit Index (CFI) = 0.97; Root Mean Square Residual (RMR): 0.19; and Adjusted Goodness of Fit Index (AGFI): 0.97.

The alternative model statistics are described:  $\chi^2 (2.94) = 380.34, p < 0.01$ ; Root Mean Square Error of Approximation (RMSEA) = 0.060; 90 Percent Confidence Interval for RMSEA: 0.053; 0.067; Normed Fit Index (NFI) = 0.97; Non-Normed Fit Index (NNFI): 0.98; Comparative Fit Index (CFI) = 0.98; Root Mean Square Residual (RMR): 0.12; and Adjusted Goodness of Fit Index (AGFI): 0.98.

Table 3  
*Goodness of Fit Tests and Fit Indices for AFC*

<b>Model</b>	<b>X2/g.l.</b>	<b>df</b>	<b>RMSEA</b>	<b>Interval for RMSEA</b>	<b>NFI</b>	<b>NNFI</b>	<b>CFI</b>	<b>AGFI</b>
Single-Factor	3.98	135	0.075	0.068; 0.081	0.96	0.97	0.97	0.97
Predicted model	2.94	129	0.060	0.053; 0.067	0.97	0.98	0.98	0.98

The Chi-square goodness-of-fit index ( $\chi^2$ ) indicates the difference between the observed covariance matrix and the one predicted by the specified model. If we use the  $X^2/g.l.$  index, we are controlling numbers of parameters we are estimating. The rule to accept this index is  $(X^2/g.l.) > 3$ . The Root mean squared error of approximation (RMSEA) was developed by Steiger (1990). Guidelines for interpretation of the RMSEA suggest that values of about 0.05 or less would indicate a close fit of the model, values of about 0.08 or less would indicate a fair fit of the model or a reasonable error of approximation, and values greater than 0.1 would indicate poor fit (Browne & Cudeck, 1993; Browne & Du Toit, 1992). The non-normed fit index (NNFI) measures relative fit. It indicates the percentage improvement in fit over the baseline independence model, but adjusting for the number of degrees of freedom in the model (Bentler & Bonett, 1980). The NNFI varies between 1 and 0. Higher values of the NNFI indicate a better fitting model, and it is common to apply the 0.90 rule as indicating a good fit to the data. Bentler (1990) proposed a comparative fit index (CFI) based on the non-central Chi squared distribution. The CFI also ranges between 0 and 1, with values exceeding 0.90 indicating a good fit to the data. Finally, higher values of the AGFI are indicating a better fitting model, and the rule to accept is 0.90.

Following these authors, and as we can observe in Table 3, both models (see Figures 1 and 2 in appendix) have obtained similar indices, but the goodness of fit statistics are better in most cases in the alternative model. In addition, the Single-Factor model does not satisfy the criteria of  $X^2/g.l.$  index. So we can conclude that the team learning construct is better explained by the four-factor model.

### *Conclusions*

The TLQ has 17 items that ask team members about four facets of team learning: *Continued Improvement Seeking, Dialogue Promotion and Open Communication, Collaborative Learning, and Strategic and Proactive Leadership that Promote Learning*. The different scales of the TLQ are described:

*Continued improvement seeking.* This scale has five items that make reference to the importance of analyzing previous experiences in team learning. The Cronbach's alpha obtained was .91. Examples of items are "*Mistakes are openly discussed in order to learn from them*" or "*Actions are taken to continuously improve*".

*Dialogue promotion and open communication.* This scale has four items and refers to the promotion of dialogue and communication to learn. The Cronbach's alpha obtained was .86. Examples of items are "*Different points of view are expressed openly and sincerely*" or "*People are encouraged to ask "why", regardless of their rank*".

*Collaborative learning.* This scale has four items and refers to team work, and knowledge sharing in team learning. The Cronbach's alpha obtained was .89. Examples of items are "*We learn from each other*" or "*Teamwork is encouraged as a way of learning from others*".

*Strategic and proactive leadership that promote learning.* This scale has four items and refers to the degree that managers seek opportunities to learn, promote training for employees, and use different strategies to acquire new competencies that facilitate learning. The Cronbach's alpha obtained was .91. Examples of items are "*Our boss continuously looks for learning opportunities for him/herself or*

*any team member”*, or *“Our boss tries to anticipate what knowledge we are going to need to acquire in order to do our jobs in the future”*.

## **Discussion**

In the present study a scale to measure team learning was developed and validated, the TQL. In a scenario where team learning is considered a relevant process in improving organizational excellence, it is important to have an instrument to measure different aspects of it. The TQL is a multidimensional scale composed of 17 items measuring four team learning dimensions: Continued Improvement Seeking, Dialogue Promotion and Open Communication, Collaborative Learning, and Strategic and Proactive Leadership that Promote Learning. The proposed four-factor structure to explain team learning was tested through Confirmatory Factor Analysis. The alternative four factor model fit the data better than the single-factor model. Internal consistency of the scale and of the different dimensions was satisfactory. In this context, we can confirm the construct validity and reliability of our team learning scale.

Our study contributes to previous research in several ways. First, we have developed and validated a questionnaire to measure team learning. In our view, the lack of a good instrument has limited the development of more empirical research on this important topic, and would explain why we know so little about team learning, even though it was pointed out almost twenty years ago as the fundamental learning unit in an organization (Senge, 1990). Future research on team learning could benefit from using this questionnaire. Secondly, we have proposed a definition of team learning and conceptualized it as being composed of four different dimensions: Continued Improvement Seeking, Dialogue Promotion and Open Communication, Collaborative Learning, and Strategic and Proactive Leadership that Promote Learning. These are relevant theoretical contributions, as team learning literature is also needed for conceptual clarification and further theoretical development.

But our study also presents some limitations. First, the reliability and validity of the TLQ was tested in only one organization. Secondly, predictive validity was not tested. Future research should test the validity of this questionnaire in predicting relevant team and organizational outcomes (e.g., team performance, team innovation...) in organizations pertaining to different industries and of different sizes.

Our study also has practical implications. The emphasis in our model was intentionally on behaviours. We were interested in describing the sorts of things that teams that learn are supposed to do. In this sense, our theoretical model should be useful for orienting teams and team leaders about the kind of behaviours they should carry out in order to learn and improve their functioning over time. The TLQ should allow team leaders to detect strengths and weaknesses in their teams, plan their team development and evaluate the progress over time.

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**Resumo.** Actualmente, o cenário organizacional está a mudar em vários aspectos que afectam o comprometimento organizacional. O conceito de aprendizagem em equipa tem emergido como um instrumento para lidar com estas mudanças e com a natureza dinâmica desta situação. Embora a aprendizagem em equipa tenha adquirido relevância nos últimos anos, os instrumentos para avaliar a aprendizagem em equipa deveriam ser desenvolvidos. O objectivo deste artigo é o de desenvolver e validar uma escala de aprendizagem em equipa, o Questionário da Aprendizagem em Equipa, considerando as quatro dimensões da aprendizagem em equipa: Procura da Melhoria Contínua, Promoção do Diálogo e Comunicação Aberta, Aprendizagem Colaborativa, e Liderança Estratégica e Proactiva, que promovem a Aprendizagem. Os resultados obtidos evidenciam a fiabilidade e a validade da escala.

*Palavras-chave:* Aprendizagem em equipa, questionário de aprendizagem em equipa, dimensões da aprendizagem em equipa.

## APPENDIX

Figure 1. Standardized solution for the One Factor model

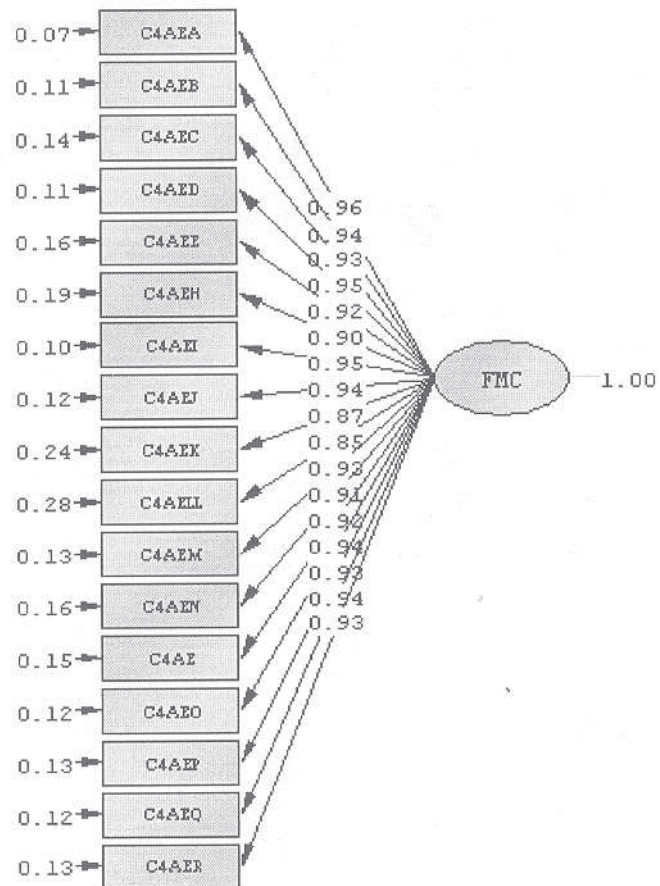


Figure 2. Standardized solution for the Four Factor model

