

# The Relation between Schoolteachers' Perceptions about Collaborative Learning and Their Employment of Online Instruction

Tamar Inbal-Shamir and Yael Kali, Technion - Israel Institute of Technology, Haifa, Israel  
[tmrsh@012.net.il](mailto:tmrsh@012.net.il), [yaelk@technion.ac.il](mailto:yaelk@technion.ac.il)

**Abstract.** The gap between known benefits of socio-constructivist pedagogies to online instruction, and schoolteacher practices has been widely documented. To better understand the gap this research characterizes the range of schoolteachers' online practices and the relation between their pedagogical perceptions and these practices. Two groups of teachers were studied: Novices and leaders in online instruction. Data-sources included interviews, researcher's journal and online activities developed by teachers. Findings indicate that leading teachers develop activities that better utilize the technology, require higher levels of thinking, better connect contents to student lives, and scaffold for rich artifacts. However, both groups scarcely utilize collaborative learning in their activities. We claim that this teacher-centered approach plays a critical role in preventing "ordinary" teachers from regular employment of online instruction. Only teachers who considered themselves "online freaks" were able to withstand the demands of this approach to online instruction.

## Introduction

Good implementation of online instruction can support meaningful learning and assist teachers in coping with didactic, content-related and organizational issues (Salomon, 2000; Dori, Tal & Peled, 2002, Linn, Davis & Bell, 2004). Such implementation can increase students' interactivity and improve their thinking and social skills (Rochelle et al., 2000; Koszalka, 2001; Kali & Linn, in press; Linn et al., 2004). In light of the awareness of the affordances that technology offers instruction, Salomon (2000) presents a vision whereby technology will serve pedagogy (rather than vice versa, which he claims is the common case), and will assist in its realization: The technology will enable access to information and provide the interactive and collaborative tools, while the teacher will create learning situations that utilize these tools. Such situations will require learners to develop higher-order thinking skills and promote their competence to work collaboratively. Recent research supports this vision, by illustrating how socio-constructivist pedagogies translate into design principles that can guide planning and developing of online instruction, which utilize the added value of technology (Kali, 2006, Kali & Linn, in press). However, the realization of this vision is still far from reality. Most online instruction requires information gathering and low level processing (Rochelle et al., 2000; Fishman et al., 2001; Mioduser & Nachmias, 2002; Herrington, Reeves & Oliver, 2005). This is especially true for k-12 settings. Research shows that online instruction is gradually integrated into schools, but that most educational websites designed by teachers represent conservative pedagogical perceptions (e.g., Lehtinen et al., 1998).

Fishman et al. (2001) claim that teachers' implementation of technology is greatly influenced by their personalities, professional knowledge, experience and pedagogical perceptions. The more a teacher experiences success using educational technology, the more positive will be her perception regarding technology's capacity to advance teaching and learning, and the more she will perceive it as an opportunity for personal professional development (Rogers, 1995; Kumari, 1996; Koszalka, 2001). Activities designed by teachers reflect their perceptions, educational goals, professional knowledge and the constraints they face. Additionally, personality traits affect the method and the extent to which online instruction is used. Fuller et al. (2000) claim that teachers who assimilate and develop online learning environments are characterized by flexibility and willingness to take risks.

This research characterizes the range of the online practice of teachers in the formal Israeli education system and examines the relation between their pedagogical perceptions and these practices. The range of online practice was defined by means of its two extremities: At one extreme, teachers who are making their first steps in implementing online instruction, and at the other extreme, teachers who are considered to be online leaders. The characterization focused on examining the extent to which socio-constructivist learning approaches are implemented in online activities developed by the teachers.

## Methods

### Sample

#### Novice Teachers

The group of novice teachers included 25 teachers from two schools (one elementary and one junior high) who were on their first year of a teacher professional development (TPD) program for online instruction. The TPD program, instructed by the authors of this paper, focused on construction of an interactive website for class activities, using an online learning content management system (LCMS). We chose to work with teachers who were motivated and who were willing to learn and to assimilate online instruction. Teachers in this group varied in their age and teaching experience. Teacher guidance was performed: a) individually or in pairs in one-hour weekly meetings throughout one year, and b) in several longer staff meetings. The school principals also participated in some of the staff meetings.

#### Leading Teachers

The group of leading teachers included four high school and junior high school teachers, who were defined, on a national level, as "online leaders". Three of these teachers received national awards for their online practices. These teachers, who had participated in the past in various TPD programs for online instruction, define themselves as "online freaks". In their current practice they develop and maintain websites for their students in a variety of science topics, and participate as instructors in TPD programs.

### Tools and Data Sources

#### Interviews (Leading Teachers)

Two semi-structured two-hour interviews were conducted with each of the four teachers. The first interview documented the process each of the teachers went through until attaining the status of "leading teacher". In this interview, we also wanted to understand the teachers' positions regarding the added value of integrating online instruction. In the second interview, the teachers presented selected activities from their websites, explained the pedagogical thinking that guided them in the development of the activities, and explained how the activities contributed to the teaching and learning in their classes.

#### Researcher's Journal (Novice Teachers)

The relationship with the group of novice teachers was ongoing and lasted throughout the entire year. We therefore used a researcher's journal as the primary tool for collecting information from this group of teachers. The journal documented the meetings and insights that emerged during the meetings and conversations held with these teachers.

#### Activities Developed by Teachers

The activities developed by both novice and leading teachers were a main information source to characterize the range of online practice. Teachers from each of the groups constructed class-sites which included all the online activities they developed. The four leading teachers had rich websites with dozens of activities each, while novice teachers had class-sites with fewer activities. For the purpose of the research, we decided to randomly select from these websites a total of 20 activities per group (a total of 40 activities). The activities represent a broad range of contents, covering both humanities and scientific topics and designed for a wide range of ages, from elementary level to high school level.

#### Rubric for Characterizing and Analyzing of Online Activities

Several theoretical frameworks exist that describe the characteristics of online instruction (see for instance, Mioduser & Nachmias, 2002; Tubin et al., 2003; Herrington, Reeves & Oliver, 2005). However, since we wanted to evaluate, both quantitatively and comparatively, online activities developed by teachers from both groups, we had to develop a rubric that would enable us to do so (Table 1). The rubric we developed comprises six dimensions that constitute a measure of "good" teaching according to a socio-constructivist perspective. For each dimension, three performance levels were defined: low, intermediate and high.

Data analysis focused, first, on using the rubric to characterize the online activities designed by the teachers, and second, on analyzing the interviews and researcher's journal in order to characterize the pedagogical perceptions held by novice and leading teachers regarding the integration of online instruction in their practice.

This analysis enabled us to find a relationship between the perceptions of the teachers from both groups and the pedagogical design of the activities they developed.

Table 1: Rubric for Characterizing and Analyzing Online Activities

Dimension	High Level (3)	Intermediate Level (2)	Low Level (1)
<b>Use of the Technology's Added Value</b>	Technology is essential for the activity. Students are referred to a variety of rich, current websites that can assist in understanding the contents.	The technological component might create interest and innovation, but with no fundamental change in the essence of the learning.	Use of technology is technical and does not affect the essence of learning. Students download traditional worksheets, fill them out and return them to the forum or directly to the teacher.
<b>Required Level of Thinking</b>	The activity encourages higher order thinking: (posing questions, taking a stand, making conclusions) and encourages creativity, responsibility and knowledge integration. (Levels 3-6 - Bloom, 1956)	The activity requires the learner to give examples, descriptions, summaries or general explanations of information gathered from the internet. (Level 2 - Bloom, 1956)	Memorization of knowledge. Focus on standard questions and answers. Oriented towards simple information-gathering assignments. (Level 1 - Bloom, 1956)
<b>Peer Learning</b>	Online components used to support collaborative learning as an essential part of the activity. Learners serve as information sources for their peers.	Scaffolds explicitly require students to work in pairs or groups, but there is no technological support for interaction between fellow students or between the groups.	There is no reference to collaborative learning. Learners are sometimes prevented from cooperating with one another. Projects are occasionally uploaded to the forum, but only for review by the teacher.
<b>Making Contents Accessible</b>	The activity is connected to the learner's cultural world and previous knowledge and experience, by choice of contents, nature of problems; social context.	An attempt is made to relate the activity to the learner's world, but the connection is artificial or not meaningful.	There is no attempt to relate and make the contents accessible. Emphasis is on content that the learner must know or remember.
<b>Scaffolding for Rich Artifacts</b>	Structured and scaffolded assignments, that help learners construct an artifact, and enable the teacher to serve as a facilitator. Artifact is diverse, creative and promotes personal capabilities and self-expression.	Scaffolds enable a product with a certain degree of openness and personal expression, but are too general to support a complex task. For instance, "Write a story about...", "What I would do if...", "My opinion on..."	Scaffolds guide towards a uniform, closed artifact defined by the teacher. No creativity is required to produce the artifact. Such activities include: standard questions and answers, sorting of data in a table, etc.
<b>Embedded Assessment</b>	Assessment is performed by the teacher or by fellow students according to clear and known criteria. Formative assessment is embedded in the learning process and enhances it.	There is reference to the assessment of artifacts, but no clear criteria are presented. Artifacts are sometimes presented on the website or in class, but without prompts for further learning from these artifacts.	There is no reference to the way in which the learner is assessed. Assessment is summative. Products are sent to the teacher to be checked and graded.

## Findings

### Online Activities Developed by Teachers from the Two Groups

Figure 1 shows the frequency distribution of the levels of the activities developed by the two groups of teachers and illustrates the difference between the two groups. The distribution of the activities developed by the novice teachers tend more toward the lower levels: 8 activities at the 1-1.5 level (40%); 9 activities at the 1.6-2 level (45%); 3 activities at the 2-2.5 level (15%) and no activities at the 2.6-3 level. The distribution of activities developed by the leading teachers is more symmetric: 3 activities at the 1-1.5 level (15%); 7 activities at the 1.6-2 level (35%); 6 activities at the 2-2.5 level (30%); and 4 activities at the 2.6-3 level (20%). T-test reveals that the difference between the mean value obtained for all the novice teachers' activities (1.6) and that obtained for all the leading teachers' activities (2.1) is statistically significant ( $P < 0.001$ ).

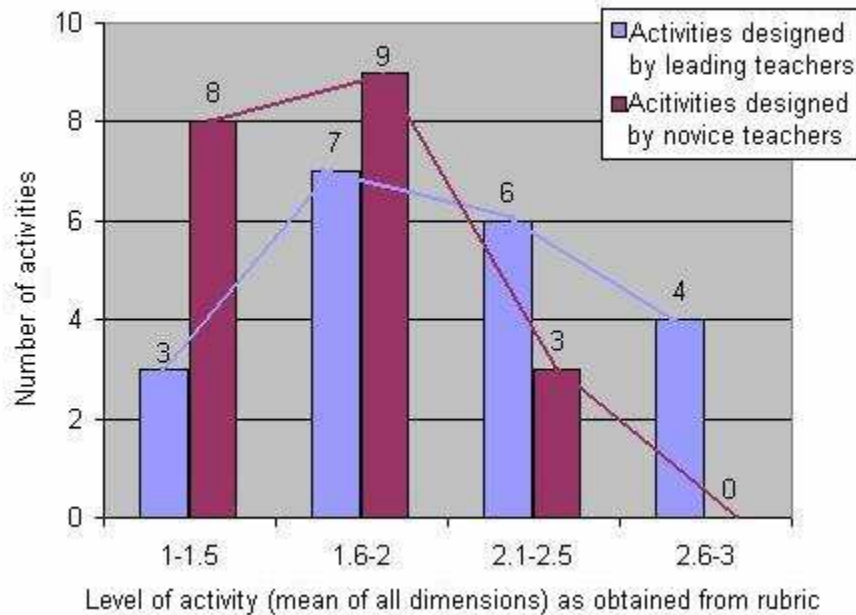


Figure 1 - Distribution of Activities Developed by the Two Groups of Teachers, by Level (N=40)

In order to better understand the differences between the activities developed by teachers from the two groups, we present the values obtained using the rubric for each of the pedagogical dimensions investigated (Figure 2). (\* designates significant difference,  $P < 0.001$ )

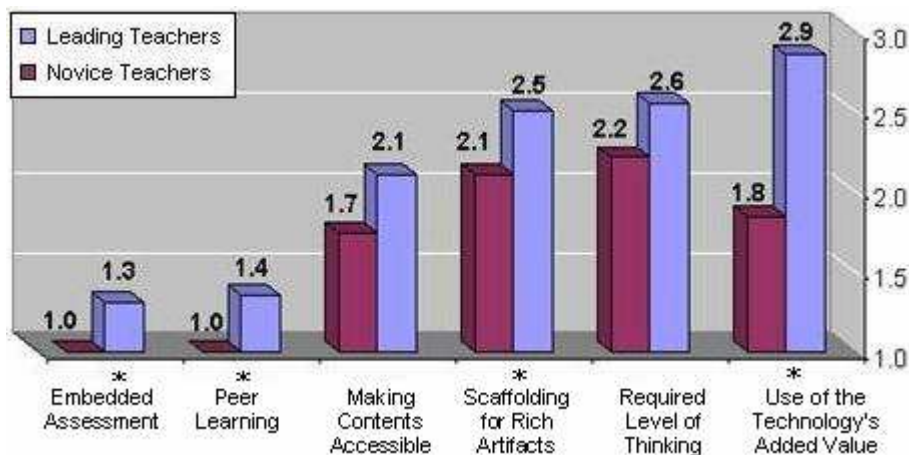


Figure 2: Online Activities Developed by leading teachers (N=20 activities) and Novice teachers (N=20 activities)

As seen in Figure 2, the leading teachers rate significantly higher on all of the dimensions examined. A statistically significant difference was found for all of the dimensions except for *Required level of thinking* and *Making contents accessible*. The greatest difference between the two groups of teachers was in the dimension that examined the *Use of the technology's added value* (1.8 for novice teachers vs. 2.9 for leading teachers). In other words, in activities developed by leading teachers, technology is an essential support; it enriches the contents with visualizations and with a variety of links that are both updated and relevant to the learning; it supports active learning and encourages online dialogue. On the other hand, the novice teachers tended to guide the learner in a more conservative teacher-centered approach; they typically constructed worksheets with traditional teaching characterizations and uploaded them to the site so that students would be able to complete and submit with answers.

The dimension *Required level of thinking* shows that teachers from both groups are aware of the need to encourage learners to function at high levels of thinking. Values obtained for this dimension, were relatively high (2.2 for novices vs. 2.6 for leaders) and the difference between the two groups was not statistically significant. Nevertheless, the activities constructed by the leading teachers were found to better guide learners towards the use of high-order thinking skills, in which learners were required to perform assignments that involved drawing conclusions, posing questions and synthesizing information.

Analysis of the dimension *Scaffolding for rich artifacts* revealed that activities developed by the leading teachers included structured and detailed scaffolds that encourage autonomous learning and guide learners to create rich, varied and creative artifacts (2.5). Despite the statistically significant difference between the two groups, the activities of the novice teachers also achieved relatively high values on this dimension (2.1) compared with other dimensions. The relatively high values obtained stem from an emphasis in these activities on the need to encourage the learner's creativity (for example, "Write an essay about..."). Nevertheless, these activities, unlike activities developed by the leading teachers, did not provide sufficient scaffolding to assist students in constructing the artifacts.

Analysis of the dimension *Making contents accessible* revealed that the two groups of teachers do not sufficiently use knowledge from the students' daily lives to make the teaching contents more accessible. Although the values obtained for the activities developed by the leading teachers were slightly higher than those obtained for the novice teachers (2.1 vs. 1.7, respectively), it seems that the emphasis in the activities of both groups was placed primarily on the hierarchical structure of the contents and not enough on finding ways to make these contents accessible.

The two dimensions that rated lowest for both groups were *Embedded assessment* and *Collaborative learning* (1 vs. 1.3 and 1 vs. 1.4 for novice vs. leading teachers, respectively). In other words, both leading and novice teachers do not regard the computer as a tool that can assist in providing alternative assessment and both groups of teachers fail to sufficiently encourage online collaborative learning. Although for both of the teacher groups these two dimensions rated low compared with the other dimensions, there was still a statistically significant difference between the two groups. For instance, analysis of the dimension *Embedded assessment* showed that leading teachers frequently present the criteria for assessment of the required artifacts within the activity.

However, technology is not used to perform any ongoing embedded assessment, but rather only to send the artifact to the teacher and to receive summative assessment. Artifacts are occasionally displayed on-site, but they are assessed by the teacher only. Only two of the twenty activities developed by leading teachers contained any reference to peer assessment. Among novice teachers, on the other hand, no reference at all was made to this dimension in all of the twenty activities examined.

A statistically significant difference which we pay special attention to, was found between the two groups with respect to the second low-rating dimension, *Collaborative learning*. Among the novice teachers, no reference at all was made to this dimension, whereas among the leading teachers, we found only slight implementation of collaborative components in their online teaching. Only five out of the twenty activities developed by the leading teachers contained any reference at all to this dimension. In these activities, students were required to express their opinion about artifacts created by their fellow classmates. Alternately, scaffolds were such that they guided the students towards working collaboratively in class on the construction of artifacts. No scaffolds were found for the use of technology as a tool that promotes collaborative organization of knowledge or interaction between student groups.

In order to enable the reader to gain some idea about the characteristics of the activities and the way in which we analyzed each one of them using the rubric, we now present sample analyses of two activities developed by the teachers. The first, which we rated high, was developed by a leading teacher, and the second, rated low, was developed by a novice teacher.

### Example of an Activity Rated High Using the Rubric

*Genes for Breakfast* is an activity designated for 9th grade science students. The activity starts by presenting for discussion, the problem of genetically engineered food as it exists today in various countries, and its possible affect on our health. Students are asked to write their personal opinion on the subject and to refer to the opinions of others in a forum. Later on, the activity guides the students to work in teams to explore the subject from different aspects using links provided in the site. Finally, the students are required to present in class the advantages and disadvantages of consuming genetically engineered food, according to the approach they choose to represent. This activity constitutes an example of the meaningful use of technology, which integrates exposure to varied information and active discussions on the forum (Use of the technology's added value = 3). The issue is presented from a perspective that is accessible to the students and it refers to their personal opinions (Making contents accessible = 3). The activity encourages synthesis and presentation skills (Required level of thinking = 3) and active scientific inquiry as well as the creation of varied artifacts (Scaffolding for rich artifacts = 3). Students are required to work collaboratively in groups, to present the artifacts to the entire class and to address the opinions of their peers in an online discussion (Collaborative learning = 3). However, there was no reference in this activity to the assessment dimension (Embedded assessment = 1).

### Example of an Activity Rated Low Using the Rubric

*Idioms* is an activity intended for 5th graders and includes a crossword puzzle and a list of words to be used in its solution. Students are required to download the file and fit the words from the list into the crossword puzzle according to definitions that appear in the file. If they fit the words in correctly, they should obtain a sequence in the middle of the crossword puzzle that contains an idiom that was previously learned in class. The activity offers a link to an online idiom glossary (a website containing idioms and their meanings). The idiom glossary can help the learners if needed, but there is no explicit instruction as to the way it can be used. This activity is an example of an assignment in which the use of technology is technical and has no effect on the essence of the learning. The students download the file, follow the instructions and submit their work to the teacher (Use of the technology's added value = 1). The link to the online idiom glossary does not change the activity's essence, since it is unrelated to the instructions the students receive and does not serve as a tool to raise the learner's level of thinking (Required level of thinking = 1). The artifact is uniform and defined by the teacher (Scaffolding for rich artifacts = 1) and there is no attempt to relate the contents to the learner's world; The activity deals with an idiom that was learned in class and it makes no current or relevant use of it, which might stir up some interest among the learners and require them to use their personal knowledge (Making contents accessible = 1). Again, there is no reference to the collaboration dimension (Collaborative learning = 1) or to the assessment dimension (Embedded assessment = 1).

## **Pedagogical Perceptions of Novice and Leading Teachers**

The analysis of the researcher's journal and the interviews held with the two groups of teachers helped us identify their perceptions regarding the role of online instruction in their practice and the way in which they perceive the added value of its use. Table 2 presents the main perceptions of the two groups of teachers as they emerged from the typical statements collected from the researcher's journal and from the interviews (white cells in the table represent similar perceptions, and gray cells represent different perceptions between teachers in the two groups).

The table reveals that teachers from both groups had similar perceptions regarding three aspects of online instruction (Online instruction assists in personal and professional development; Role of online instruction in teaching practice; and Value of peer learning). Their perceptions with respect to two other aspects (Role of online instruction in daily life and Online instruction as a means for creating dialogue) were, however, different.

Table 2: Perceptions of teachers regarding the integration of online instruction in teaching

Perception Categories	Novice Teachers	Leading Teachers
1) Online instruction assists in personal and professional development	<ul style="list-style-type: none"> <li>- Enhances the personal professional development process</li> <li>- Empowers the teacher's place within the school community and outside of it</li> <li>- Enables the teacher to autonomously construct professional activities</li> </ul>	
2) Role of online instruction in teaching practice	<ul style="list-style-type: none"> <li>- Diversifies, improves and enriches teaching and learning</li> <li>- Enhances student motivation</li> <li>- Exposes students to current information that is attractive and relevant to their learning</li> </ul>	
3) Value of peer learning	<ul style="list-style-type: none"> <li>- Teachers do not support peer learning. They range from total objection (novices) to acceptance due to system constraints (leaders), but not due to an understanding of the pedagogical benefits of collaborative learning.</li> </ul>	
4) Role of online instruction in daily life	<ul style="list-style-type: none"> <li>- Imposes an additional burden on the teacher</li> <li>- Perceived as a random and non-permanent project activity</li> </ul>	-Is an aid to teacher, an integral part of daily teaching
5) Online instruction as a means for creating dialogue	Online instruction is not considered as a means for dialogue with students. Dialogue is limited to classroom boundaries of time and place.	Online instruction is considered as a means for creating an ongoing educational dialogue between teacher and student, also after school hours.

White represents perceptions that are similar; Grey represents perceptions that are different.

## Discussion and Conclusions

The findings indicate that there are significant differences in the characteristics of online practices of teachers from the two groups, despite the fact that they are similar in most of their pedagogical perceptions regarding online instruction. With regards to practices – the leading teachers were, in most cases, rated on the high range of the scale. The activities they developed were higher in all dimensions examined. The novice teachers, on the other hand, use technology to implement conservative pedagogical approaches and, as a result, the activities they developed rated lower in all of the dimensions examined. These teachers tended to construct traditional activities, which focus on information gathering and rote learning. The digital communication with students in this group was mainly for purposes of administration and organization rather than for pedagogical objectives.

With regards to perceptions – the findings indicate that teachers from both groups exhibited positive perceptions regarding the need to integrate online instruction. For them, this is an important means for improving and diversifying teaching, which enables to expand the world of information available to the students and increase their motivation. Teachers from both groups also feel that the school website reflects the activities and events in the school and believe that their meaningful use of online instruction will grant them professional appreciation by the school management, the parents and the students. For them, this is an opportunity to gain professional development and to accept professional recognition within the school and outside of it.

We believe that the differences between the two groups' online instruction practices, as depicted from the activities they developed, are related to two aspects in which the two groups differed in their perceptions. The first difference is in the teachers' perception of the role of online instruction in their daily life. The leading teachers made online instruction an inseparable part of their practice. They use online instruction to expand learning beyond the school boundaries of time and place, which, according to the leading teachers, improves their work, enriches the learning and even enables them to get more work done. Perceiving online instruction as a tool that makes teaching more efficient is a significant factor in their desire to continue using it on an ongoing basis. As apposed to this view, the novice teachers regard online instruction as a burden that makes them work harder, while receiving no additional compensation. As far as they are concerned, online teaching constitutes a noncommittal activity, a refreshing addition to the regular learning, but one that is not an ongoing daily part of their practice.

The second difference was found in the high availability of the leading teachers for communication with their students. Leading teachers regarded online instruction as a means for creating an ongoing learning dialogue

with the students and for providing individual assistance if necessary. The possibility of holding such a dialogue enables the teachers to support students and to form personal relationships with them, but also requires that the teachers commit to being available for the students and to assist them at all times. It is no wonder, therefore, that not all teachers are willing to make that commitment after school hours. Such a commitment serves, for many teachers, as a deterrent, and they prefer the face-to-face dialogue limited to the time and space boundaries of the classroom.

It is reasonable to assume that most of the differences in the activities developed by the two groups can be explained by the vast experience that the leader teachers acquired. Their perseverance brought them to develop a culture, in which online instruction is inseparable from their teaching practices. It is clear that this kind of culture cannot develop among teachers who see online instruction as burden. The latter teachers, who will probably continue to use technology sporadically, if it all, will not have the opportunity to develop the expertise in designing online activities, which the leading teachers have developed. If that is the case, the question is raised as to how to support the development of sustainable online practices among novice teachers, which would enable them to gradually develop expertise in developing meaningful activities?

Part of the answer might be found in the low values obtained for the *Collaborative learning* dimension for activities developed by teachers from both groups. We regard this as one of the most important findings in the study. These low values reflect the pedagogical perceptions of both groups regarding peer learning, which were found as negative and even antagonistic for both groups. Although the leading teachers occasionally implement online discussion, they do not encourage peer learning of the kind that enables learners to share knowledge, consult with each other and construct common knowledge together. The novice teachers exhibited greater objection to the implementation of collaborative learning; They saw it as a complete waste of time. In fact, teachers from both groups did not consider peer learning to be a resource that can contribute to classroom teaching and learning. Collison et al. (2000) present an approach to online instruction in which the capability of technology to enable dialogue between students, might free the teacher from the need to be an exclusive source of guidance for each and every student. They call this the "Moving out of the middle" approach, or MOOM. In this study, teachers from both groups did not realize the support they can gain from peer learning of their students, and thus only those few that were "online freaks" were able carry out the tremendously demanding task of teacher-centered online instruction. We claim that the student-centered approach to online instruction, which takes advantage of collaborative learning strategies, is the key to adoption of online instruction also by "ordinary" teachers, who will be willing to integrate it into their practices if they will not need to become enslaved to it. We recommend that future TPD programs place emphasis on making online instruction more sustainable for "ordinary" teachers, by fostering a student-centered approach, and specifically, by realizing the added value of collaborative learning to support online instruction.

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