

Promoting teachers' innovation by using the One-Minute Paper

Fernando Vera¹

 <https://orcid.org/0000-0002-4326-1660>

¹Red Internacional de Investigadores en Educación, Chile

Correspondencia: fernandovera@rediiie.cl

Received 29/01/2022 • Revised: 02/02/2022 • Accepted 25/02/2022

ABSTRACT

Assessing learning is a critical issue in higher education. Implementation of assessment methods should promote the active engagement of students. In this line, the use of the One-Minute Paper (OMP) provides an easy and cost-effective method for gathering information about student learning. This formative assessment strategy uses brief questions to determine if students have correctly identified the most important topics from a class and to determine if they are left with any confusion concerning a particular topic. This article seeks to explore the use of the OMP model - as a formative assessment tool - by faculty members. For this purpose, a web-based questionnaire was administered to a sample of 45 teachers at a Chilean private university. Findings show that teachers use question-based assessment methods to improve students' learning, but are not familiar with the OMP model. Therefore, *ad hoc* training should be implemented and future research should be conducted to explain the effectiveness of this formative assessment technique.

KEYWORDS: Formative assessment, Active learning, Critical thinking, Higher education..

INTRODUCTION

The effectiveness of the traditional lecture as a vehicle for student learning has been questioned with educationalists espousing the value of a more dialogic innovative approach (Cannon & Newble, 2000; Vera, 2016). Within this context, educational innovation should encourage teachers to transform various aspects of their practice, such as technology, teaching methods, learning processes and people. Therefore, it implies a change in learning resources, curricular contents and learning environments. The perceived difference should be related to the novelty of the element being improved, the added value of the innovation to the teaching/learning process and the relevance of the proposal to the educational center and its stakeholders.



However, the core of any educational innovation is the teacher, who initiates transformative changes, creates appropriate learning environments that promote learner Independence and who always poses critical questions to challenge his or her students. In this respect, questions are the key means by which teachers find out what their students already know, identify gaps in knowledge and understanding and scaffold the development of their understanding to enable them to close the gap between what they currently know and the learning goals (Hall, 2016). Moreover, teachers' questioning strategies are essential to the growth of critical thinking skills, creative thinking skills, and higher level thinking skills (Schwartz, 1996, cited in Astrid, 2019).

Furthermore, it is generally agreed that asking questions opens the door to knowledge. Questioning is the strategy that propels readers forward. When readers ask questions, they are most likely interacting with the text. One question leads to another one. Thus, the more students are exposed to questions, the more engaged they are in their learning process. In fact, most educators agree that the entire teaching and learning process lies in the art of questioning. This is why it is so important that teachers not only ask students appropriate questions, but also teach them how to ask them and one another questions. It goes without saying that the more students learn to question, the more sophisticated their questions become. In practice, questioning encourages recalling, deepens the learning process, promotes students' imagination and problem-solving, satisfies their sense of curiosity and increases their creativity (Zolfaghari, Fathi & Hashemi, 2011).

From this standpoint, questioning in the classroom enables students to broaden their learning experience. However, practice shows some teachers still have difficulties in asking higher-level thinking questions. Specifically, some teachers ask questions that are just recall and comprehension (lower-level thinking), which do not require students to actively process information. Conversely, higher-level thinking questions help students explore ideas and make connections, helping them see the "big picture" of the learning process. This, in turn, leads to greater motivation and improved engagement.

LITERATURE REVIEW

The One-Minute Paper Technique

As is often the case with teaching tools, the One-Minute Paper (OMP) has developed organically over the last 40 years. Alternatively called the "minute paper" or the "half-sheet response," it is believed that this technique has been conceived by University of California at Berkeley Professor Charles Schwartz in the late 1970s (Holtzman, 2007, cited in Meehlhause, 2016). The OMP is a formative classroom assessment technique that takes about one-minute to complete and is usually conducted before class time ends. This prompts students to react and identify the most significant (useful, meaningful, relevant, challenging, etc.) points they have learned during a particular session. It is a versatile, easily employable and low-tech innovation widely spread in American and European universities - designed to assess students' learning that involves asking one, two or three quick, but deep, questions on the material covered.

As an active learning strategy, the OMP aims to involve students in the learning process through one or more questions (two or three). By asking students to write down a short paragraph in class, teachers can have students reflect on presented knowledge and collect informative feedback. The teacher should allow students to complete the writing in one-minute or less (Davis, Wood, & Wilson, 1983). According to these researchers, this strategy was originally developed by a Physics professor at the University of California, Berkeley, popularized by Cross and Angelo (1988) and also implemented in the Harvard Assessment Seminars (Light, 1990, cited in Ashakiran & Deepthi, 2012) - designed to provide teachers with anonymous feedback on what students are learning in class.

As it can be noted, systematic questioning is the basis of this modest, but effective technique. Paradoxically, there is evidence to suggest that learners at all levels find many teachers are poor users of questions (Scales, 2018). According to this author, research suggests that teachers ask up to 400 questions every day, but only about 8% of these could be classified as higher-level questions. Through these questions, students may be able to summarize in a few words what they have already learned. In addition, this strategy is quite effective because it provides manageable amounts of timely and useful feedback for both teachers and students. Providing students with positive feedback can help them clarify their thinking, take risks, and apply concepts in new formal, non-formal and informal learning contexts (Vera, 2021).

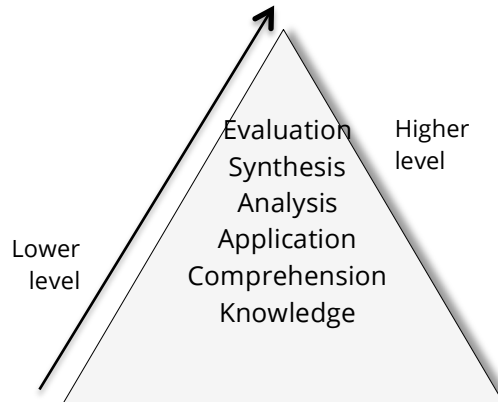
Another point to consider is that questions employed in this technique should be purposeful, clear, brief and challenging. Regarding cognitive development, they may range from lower levels to higher levels of analysis and evaluation. So, it is suggested that teachers should decide where in the Bloom's taxonomy of questions, students should be operating. Although, in the researcher's opinion, the best choice is always to allow students to answer higher-level questions and, generally, allow them to think more critically about what they have already learned.

It is widely agreed that class questioning is an essential element of effective teaching (Vale, 2013; Long, Blankenburg & Butani, 2014; Christensen, 2017; Vera, 2020). Teachers and students will both benefit from questions that are purposefully designed (Peterson & Taylor, 2012, cited in Peterson, 2017). However, teacher still have difficulties when planning and implementing questions that require higher-level thinking appear to be a complex task (Almeida, 2012; Vera, 2016; Vera, 2020).

In fact, Bloom believed that 95% of all classroom questions were at the low level of learner memorization of knowledge (rote memory). For this reason, he considered that questions should be classified in terms of complexity from the low recall level of knowledge to the advanced level of evaluation. Thus, the development of students' higher-order learning is a critical component of 21st-century education" (Agarwal, 2019). From both an educational perspective, it is of practical interest to develop robust active learning strategies that increase higher-order learning.

To understand the difference between these two types of questions, there are six general levels in Bloom's original taxonomy of cognitive development (Figure 1).

Figure 1: Taxonomy of cognitive development



Note: Own adaptation based on Bloom (1956).

As mentioned above, questions are the backbone of interactions between students and teachers. Fortunately, there are many ways to vary the OMP format. According to Stead (2005), innumerable variations on this basic format are possible. Among other things, the questions can be made more specific to address particular issues raised in a lecture. In addition, students' responses can be anonymous or signed and may or may not be graded. In this respect, anonymous answers may be preferable to signed ones so as to encourage students to complete the questions openly rather than writing what they perceive to be an acceptable response for the teacher (Stead, 2005). In addition, the OMP could be completed individually or collaboratively in small groups and conducted at the start of, midway through or at the end of a class. Moreover, students' opinions of this technique are generally favorable, in both small and large group teaching (Stead, 2005). Whatever decision is made, questions in the OMP model should be preferably open-ended and used purposefully to achieve well-defined goals. As literature suggests, using these questions help students to:

- Develop interest and motivate them to become actively involved in lessons;
- Encourage their curiosity and creativity;
- Encourage them to think beyond the obvious;
- Allow them to include more information about the topic;
- Provide them with opportunities to explain something more specifically;
- Nurture insights by exposing new relationships, and
- Recall recent or past events.

Ideally, students should be challenged to use their thinking skills. For example, Bloom's taxonomy is a hierarchical system for ordering thinking skills from lower to higher, where each level requires a student's mastery of the skills below it. It is essential that a teacher be able to classify his or question at a specific level. This taxonomy is helpful tool for defining the kinds of thinking skills teachers expect from students and for helping to establish congruence between the teacher's goals and the questions he or she asks. Anyway, It is important to adopt a sequence of open-ended questions that do not end with the correct answers. Correct answers should be rewarded with follow-up questions that extend the knowledge and provide students with an opportunity to engage with the teacher. As it is agreed, open-ended questions encourage students to think beyond textbook-based or literal answers, thus eliciting a range of responses. They also help the teacher to assess the students' understanding of content. Moreover, addressing open-ended questions (What, Which, When, Where, Who, Why, How) encourages the development of critical thinking skills (Vera, 2020). Teachers can help students think critically by doing the following activities:

- Pose challenging open-ended questions;
- Ask different kinds of questions;
- Seek students' understanding of a given topic;
- Promote students' habit of re-processing a lecture;
- Ask students to create an analogy;
- Get different students to work together;
- Involve students in making connections or "connecting the dots",
- Promote students' curiosity and deep learning; and
- Make students exchange their responses or solutions.

As mentioned above, the OMP questions could be asked not only at the end of a lesson, as literature suggests, but at any instructional time (opening, middle or closure). The OMP model is not intended to be a static, rigid process, but rather is meant to be a flexible set of guidelines that can be altered as needed according to the learning situation (Swartz, 2016). But, how many teachers begin their class with a question? In practice, most of them begin by greeting students, reviewing previous class and stating the objectives and possible outcomes. Beginning the class with a question is an effective way to keep students focused. It also allows to frame the thinking at the beginning of a class meeting. Typically, some teachers would apply the traditional suggested questions for implementing the OMP model; while others would vary the level of questions within a single class period customize the questions to tailor to a special disciplinary need.

For example, he or she might ask the higher-level question, "How can the research question and paradigm be related in a research proposal?" If the student's response is inadequate or incorrect, he or she might ask lower-questions to check whether students know and understand the topic. In this case, he or she might then ask, "What is a research question?" or "What are the research paradigms? As students' replies reveal what concepts have not been fully understood, and what points were perceived as being of greatest importance, the possibilities to innovate are huge. Anyway, for an appropriate implementation, it is recommendable to consider the following aspects, shown in Table 2.

Table 2: *Implementation of OMP-based assessment*

Assessment Technique	How it's done	How to assess	Time needs
One-minute paper	At the start, midway through or at the end of a class period, ask students to use a half-sheet of paper and write their replies to your questions.	Review during the class or before next class meeting to clarify, correct, or deepen some disciplinary topics.	Low

Note: Own adaptation from Angelo and Cross (1993).

Classroom questioning is an extensively researched topic. In fact, teachers and students consider classroom questioning as an effective assessment tool (Iqbal, Azam & Abiodullah, 2009; Christensen, 2017; Shanmugavelu et al., 2020). The high impact of classroom questioning has led many researchers to examine relationships between questioning methods and student achievement (Vale, 2013; Christensen, 2017; Vera, 2020). But, how many teachers ask good questions that change their students to think critically? How many teachers plan their questions? And more specifically, how many teachers use some taxonomy of learning domains to structure their questions? In practice, even teachers with wide experience in teaching have difficulties in formulating effective questions. Moreover, most teachers ask specific, factual and low-level questions (Who is the main character of the story? Where is the setting of the story? What does GDPR stand for?, etc.). In this respect, class questioning poses many challenges to teachers and students. Effective questioning by the teacher is believed to focus students' attention to understand lesson content, arouse their curiosity, stimulate their imagination, and motivate them to seek out new knowledge. To better plan questions, below are some examples related to the levels of Bloom's taxonomy (Table 3).

Table 3: Questions to implement the OMP model

Level	Description	Examples
Evaluation	Using a set of criteria, established by the student or specified by the teacher, to arrive at a reasoned judgment.	<ul style="list-style-type: none"> • <i>What would you propose to mitigate pollution in your neighborhood?</i> • <i>Is the quantitative approach appropriate for this research study?</i>
Synthesis	Putting parts together to form a new whole, pattern or structure.	<ul style="list-style-type: none"> • <i>How is transformational leadership related to learning organizations?</i> • <i>How would you proceed if you were going to interview subjects for your research?</i>
Analysis	Breaking a piece of material into its parts and explaining the relationship between the parts.	<ul style="list-style-type: none"> • <i>What are the major attributes that Steve Jobs used to transform Apple Inc.?</i> • <i>What factors in the government's COVID plan are affecting people's access to social resources?</i>
Application	Using concepts or tools in new situations in order to show transference in increasingly complex ways.	<ul style="list-style-type: none"> • <i>Based on today's lesson, what research design is appropriate for this problem?</i> • <i>How can ecommerce meet the changing needs of young entrepreneurs?</i>
Comprehension	Understanding the meaning of remembered material, usually demonstrated by explaining in one's own words or citing examples.	<ul style="list-style-type: none"> • <i>How have small craft firms contributed to the local economy in your country?</i> • <i>What does sustainability mean?</i> • <i>What is Peter Senge's idea of learning organization?</i>
Knowledge	Remembering previously learned material, e.g., definitions, concepts, principles, formulas.	<ul style="list-style-type: none"> • <i>What types of plastics can be recycled?</i> • <i>Who was Nelson Mandela?</i> • <i>In what US State is the city Nashville?</i>

Note: Own elaboration.

As a student-centered strategy, the OMP should be promoted as an effective tool to engage students in their learning process. It should also be considered as an important means to give students an immediate opportunity to raise awareness of issues they have not fully understood (Whittard, 2015). Furthermore, this formative assessment strategy requires no technology and only teachers' skill asking the appropriate questions. In addition, it is a natural form of formative assessment, which gives a snapshot of learning at any particular point and allows for necessary teaching adjustments. As an active learning strategy, use of OMP serves two purposes (Ashakiran & Deepthi, 2012): (i) Find out how well students understand important concepts taught during a class period and (ii) provide an insight on how to improve teaching strategies in succeeding classes.

Common questions used in the OMP model

Although, some researchers suggest using certain open-ended questions in this assessment model, the fact is that any questions are appropriate as long as they promote students' critical thinking and creativity. As its name suggests, students are given a minute or two to complete the exercise. After collecting the papers, the teacher reads the answers and ideally responds to them in the next class or privately on an individual basis. Below are the open-ended questions teachers typically assign at the end of a class:

- What was the most important thing you learned in class, today?
- What was the muddiest point in class, today?
- How can you apply the concepts learned today, in your daily life?
- What examples did I use today that helped you the most? The least?
- What is the main application of the content we discussed today?
- How could you deepen some of key concepts learned in class, today?

Potential advantages of the OMP model

Literature review has shown that the OMP model has multiple advantages, some of which are listed below:

- The OMP model can improve the quality of class discussion by having students write briefly about a concept or issue before they begin discussing it.
- The OMP model benefits students who are more fearful of public speaking by giving them the opportunity to share their knowledge and opinions.
- The OMP model promotes students' participation and involvement in their learning process.

METHODOLOGY

This study employed a descriptive research survey design. The purpose of the present study was to explore the use of the OMP model by faculty members, at a Chilean private university. They were randomly selected and have not participated in training for OMP model. To conduct this study, three research questions were formulated:

1. Where in the lesson design, do teachers frequently use question-based assessment?
2. How many teachers use question-based assessment to promote learning?
3. Are teachers familiar with the one-minute paper technique?

The research instrument used in the data collection process was a web-based questionnaire, which comprised four demographic questions and six close-ended questions, covering question-based assessment, including the use of the OMP model. The dichotomous questions of the questionnaire are based on the BRUSO model¹ and were chosen because they are suitable for this study and are much easier for researchers to analyze (Peterson, 2000).

The items in the questionnaire were drawn from several research articles on classroom questioning (Table 4). Special emphasis was placed on the use of questions for assessing student learning at the start of, midway through and end of a class meeting. In addition, it is important to note that a brief description of the OMP model was given along with the directions to respond this instrument.

Table 4: *Items of the research instrument*

Questions
1. Have you ever used the one-minute paper model for formative assessment?
2. Have you ever used open-ended questions to assess your students' learning?
3. Have you ever used open-ended questions at the start of the class?
4. Have you ever used open-ended questions midway through a class?
5. Have you ever used open-ended questions at the end of a class?
6. Would you use the one-minute paper to assess student learning?

Note: Own elaboration.

¹BRUSO stands for "brief," "relevant," "unambiguous," "specific," and "objective."

FINDINGS

Sixty-seven teachers of the Faculty of Health were invited to respond a web-based questionnaire, using only an URL link. Only 45 accessed the URL link and responded (n= 67.2%). Of this group, 41 (69%) were predominately females (aging from 35-57 years) and 14 (31%) were males (aging from 32-54 years), with 24 of them holding a postgraduate degree. All of them have less than 5 years of teaching experience.

In general, question-based assessment is highly valued by the respondents, as the majority of them has used open-ended questions to assess students' learning (91.1%). Regarding the use of the one-minute paper technique, the majority of them are not familiar with this assessment model (99.1%), but most of them would use it to assess student learning (93.3), as shown in Table 5.

Table 5: *The questionnaire*

Questions	n	%
1. Have you ever used the one-minute paper model for formative assessment?		
- Yes	4	8.9
- No	41	99.1
2. Have you ever used open-ended questions to assess your students' learning?		
- Yes	28	62.2
- No	17	37.8
3. Have you ever used open-ended questions at the start of the class?		
- Yes	6	13.3
- No	39	86.7
4. Have you ever used open-ended questions midway through a class?		
- Yes	37	82.2
- No	8	17.8
5. Have you ever used open-ended questions at the end of a class?		
- Yes	9	20.0
- No	36	80.0
6. Would you use the one-minute paper to assess student learning?		
- Yes	42	93.3
- No	3	8.9

Note: Own elaboration.

Findings also indicate that these teachers use open-ended questions more frequently midway through a class meeting (82.2%). This might reflect the implementation of a more dialogic approach to learning and teaching in higher education classrooms. Notwithstanding, questioning at the start of and the end of a class meeting is relatively low (13.3% and 20.0%, respectively).

In addition, findings show that the door is open to innovate in student assessment, as the majority of these teachers would use the OMP model (93.3%). This would pave the way to implement this assessment model in teachers' practice.

CONCLUSION

The OMP model is a versatile student-centered assessment tool, which gives ample opportunity and flexibility to students to actively engage in their learning process. As it is a question-based strategy, emphasis should be placed in classroom questioning, as one of the most important ways to promote quality learning in undergraduates. Notwithstanding, this study has shown that teachers have some difficulties in questioning throughout the three moments of instruction (opening, middle and closure).

In addition to what has been said, questions need to be carefully planned in order to move from the lower levels of Bloom's taxonomy to the higher levels, as needed. However, this cognitive transition might be very difficult to implement, as literature indicates that teachers' questions mainly cover the lower levels of Bloom's taxonomy of learning domains.

Finally, *ad hoc* training should be implemented for teachers to promote critical thinking skills in their students and integrate the OMP in their practice, as an effective formative assessment technique.

REFERENCES

- Agarwal, P. K. (2019). Retrieval Practice & Bloom's Taxonomy: Do Students Need Fact Knowledge Before Higher Order Learning? *Journal of Educational Psychology*, 111(2), 189–209. <http://dx.doi.org/10.1037/edu0000282189>
- Almeida, P. A. (2012). Can I ask a question? the importance of classroom questioning. *Procedia – Social and Behavioral Sciences* 31, 634-638. <http://rediee.cl/wp-content/uploads/Can-I-ask-a-question-the-importance-of-classroom-questioning.pdf>
- Ashakiran, S. & Deepthi, R. (2012). One-Minute Paper: A thinking centered assessment tool. *Internet Journal of Medical Update*. <http://rediee.cl/wp-content/uploads/93192-Article-Text-237877-1-10-20130827.pdf.pdf>
- Astrid, A., 1, Amrina, R. D., Desvitasari, D., U. & Shahab, A. (2019). The Power of Questioning: Teacher's Questioning Strategies in the EFL Classrooms. *IRJE/Indonesian Journal in Education*, 3(1), 91-106. <https://online-journal.unja.ac.id/irje/article/view/6601>



- Bloom, B. (1956). *Taxonomy of Educational Objectives; The Classification of Educational Goals*. NLongmans, Green.
- Cannon, R. and Newble, D. (2000). *A Handbook for Teachers in Universities and Colleges*. Fourth ed. LKogan Page Limited.
- Christensen, C. (2017). *What is the impact of effective questioning and critical, relevant conversations on sixth grade science students' agentic engagement?* Hamline University School of Education Student Capstone Theses and Dissertations. 4307. https://digitalcommons.hamline.edu/hse_all/4307/?utm_source=digitalcommons.hamline.edu%2Fhse_all%2F4307&utm_medium=PDF&utm_campaign=PDFCoverPages
- Davis, B. G., Wood, L., & Wilson, R. C. (1983). *ABCs of teaching with excellence*. Berkeley: University of California.
- Hall, G.(2016). *The Importance of Questioning*. <https://garyhall.org.uk/importance-of-questioning.html>
- Iqbal, H. M., Azam, S. & Abiodullah, M. (2008). Using Assessment for Improving Students Learning: an analysis of University Teachers' Practices. *Bulletin of Education and Research*, 31(1), 47-59. http://pu.edu.pk/images/journal/ier/bulletin-pdf/3_UsingAssessmentforImprovingStudentsLearning_Vol30_o9.pdf
- Long, M. , Blankenburg, R. & Butani, L. (2014). Questioning as a Teaching Tool. COMSEP. https://www.researchgate.net/publication/272083618_Questioning_as_a_Teaching_Tool#fullTextFileContent
- Meehlhause, K. (2016). Two Parts Reflection, One Part Selfie: A Visual Alternative to the Minute Paper. *Communications in Information Literacy* 10(1), 14-22. <https://digitalcommons.morris.umn.edu/cgi/viewcontent.cgi?article=1005&context=library>
- Peterson, D. (2017). Engaging elementary students in higher order talk and writing about text. *Journal of Early Childhood Literacy*, 19(1), 34–54. <https://journals.sagepub.com/doi/pdf/10.1177/1468798417690918>
- Peterson, R. A. (2000). *Constructing effective questionnaires*. Thousand Oaks, CA: Sage.
- Scales, P. (2018). Using questions to promote learning and understanding. <https://college.jobs.ac.uk/article/using-questions-to-promote-learning-and-understanding/>
- Shanmugavelu, G., Ariffin, K., , Manimaran Vadivelu, M., Mahayudin, Z. & Sundaram, M. A. (2020). Questioning Techniques and Teachers' Role in the Classroom. *International Journal of Education*, 8(4), 45-49. <https://files.eric.ed.gov/fulltext/EJ1268029.pdf>
- Stead, D. (2005). A review of the one-minute paper. *Active Learning in Higher Education*, 6(2), 118-131. http://rediie.cl/stead_2005-pdf/
- Swartz, M. (2016). Revisiting “The One-Minute Preceptor. *J Pediatr Health Care*, 30, 95-96. [https://www.jpedhc.org/article/S0891-5245\(16\)00006-7/pdf](https://www.jpedhc.org/article/S0891-5245(16)00006-7/pdf)
- Vale, R. D. (2013). The value of asking questions. *Mol Biol Cell*, 24(6), 680–682. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3596240/>

- Vera, F. (2016). Transformación curricular. El caso de una universidad privada chilena [Curriculum transformation. The case of a Chilean private university]. *Revista Iberoamericana de Educación / Revista Ibero-americana de Educação*, 72(2), 23-46, Organización de Estados Iberoamericanos (OEI/CAEU) / Organização dos Estados Iberoamericanos (OEI/CAEU). https://www.researchgate.net/publication/323203320_Transformacion_curricular_El_caso_de_una_universidad_privada_chilena
- Vera, F. (2020). Research skills in nursing undergraduate students: A case study at a Chilean private university. *Open Science Journal*, 5, 3-10. <https://osjournal.org/ojs/index.php/OSJ/article/view/2487/300>
- Vera, F. (2021). Implementación de metodologías activas desde un enfoque transdisciplinar: El caso de un colegio particular subvencionado chileno. *Revista Electrónica Transformar*, 2(4), 20-34. <https://revistatransformar.cl/index.php/transformar/article/view/41/21>
- Whittard, D. (2015). Reflections on the one-minute paper. Economics Working Paper Series 1502. <https://core.ac.uk/reader/191951352>
- Zolfaghari, A. R., Fathi, D. & Hashemi, M. (2011). The Role of Creative Questioning in the Process of Learning and Teaching. *Procedia - Social and Behavioral Sciences* 30, 2079-2082. <https://doi.org/10.1016/j.sbspro.2011.10.404>

Note: This article is based on the Working Paper “*The One-Minute Paper Technique: Promoting teachers’ innovation*” (Vera, 2020), available at:

<https://rediie.cl/wp-content/uploads/Working-paper-02.pdf>

