



Self-Regulation of Emotions: Towards a more Complete Evaluation of Pre-Service Primary Teacher Training

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Abstract

Pre-service teacher trainers use to ask themselves about the effectiveness of the teacher training program they are implementing. An answer could be found on the Likert-like opinion surveys of the educational work granted by many universities, which are answered by the students and can be construed as an external indicator. Nevertheless, we seek for a more systematic evaluation proposal that let us triangulate not only quantitative but also qualitative results, taking into account the concrete objectives of the different educating programs.

In order to answer this request and becoming aware of the key importance in the teaching-learning process in science education of the emotions experienced (as they play an important role in teachers' construction of pedagogical content knowledge, curriculum planning, relationships with children...), in this paper, we present an evaluation design that complete the above described characteristics. Furthermore, we show the results obtained with a semi-open questionnaire about emotions that pre-service primary teachers declare to have felt in a Science Education course.

We conclude that the impressions can run roughly as an indicator of the effect of a teacher training course, resulting the need of multiple instruments in order to consider the different aspects that a program like those require. Specifically, from the results obtained thanks to the emotions questionnaire, we found that students expressed both positive and negative emotions, and we highlight how "negative emotions" declared by students can have a different cause and play different roles in science learning considering as much quantitative as qualitative information.

1. Introduction

The search of evaluation strategies to improve teacher training is becoming increasingly important. Program evaluations can explain or increase the effectiveness of the education; delivery mechanisms to be more efficient; verify that "you're doing what you think you're doing"; facilitate management's thinking about what its program is all about; and produce information to communicate the results [1].

Teachers' trainers ask us if our developed teacher training program really works [2], and how we could know if goals are reached as we expected. In fact, the responses of fourteen science teacher educators [2] recognize not only the importance of having evidence of the initial teacher training effectiveness, but also the lack of a systematic evaluation proposals in their courses: *This is the unfinished business that we have all "how to assess"; In this respect, we all are drifting.* These evidence turn us to focus on how important aspect is the evaluation for the teacher training improvement.

2. Approach to the problem: Do we have any evidence about our teacher training effectiveness?

Usually we rely on feelings or perceptions that we perceive in our classes to check the effectiveness of our program, but per McDermott [3] these are usually not a valid indicator. Other kind of information, provided by many universities, is the scores of some items from teaching opinion surveys, answered by students, as an institutional instrument. However, it is necessary to plan a more systematic evaluation to triangulate qualitative and quantitative results which describe not only specific moments but also the evolution of student profiles throughout the training through follow-up instruments for the student teacher thinking and knowledge [2].

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To measure the effect of our initial teacher training courses we have designed and implemented an evaluation proposal that consider important aspects related to the influence of the training in prospective teachers' knowledge, satisfaction and conceptions. Our experimental design aimed at evaluating the effect of our training program on different aspects, such as the students' conceptions about science, about science teaching and learning, their scientific content knowledge, and students' satisfaction with the course. To this end, we have designed numerous instruments of different nature, seeking to combine a quantitative and qualitative analysis methodology (Table 1).

Table 1. Summary of the experimental design to assess the training proposal

<i>Aspects evaluated</i>	Instrument	Time
<i>Evolution in didactic conceptions</i>	Questionnaire	Pre / post course
	Activity (<i>students' productions</i>)	
	Semi-structure Interviews (<i>individual interviews for students</i>)	
	Daily classroom forums (<i>students' journals</i>)	Throughout the course
<i>Scientific knowledge acquired</i>	Misconceptions questionnaire	Before learning scientific contents
	Exams	Middle and end of the course
<i>Degree of satisfaction & opinions</i>	Opinion surveys	Post course
	Anonymous forum to assess the subject (just examples)	Throughout the implementation of the proposal

The results obtained using the instruments shown atop, allowed us to confirm the effects produced by the training course [2] [4].

3. Towards a more complete evaluation of pre-service primary teacher training: Self-regulation of emotions

This evaluation of effectiveness would be insufficient if we don't make use of the training function that the evaluation has, so that students regulate their own learning. Such self-regulation often focuses on the cognitive aspects, nevertheless, as the processes of learning and teaching science are not merely cognitive but are highly charged with feelings, the importance of emotions in teaching and learning advocates the need to consider the cognitive and affective dimensions [5], and metacognitive regulation should be expanded to include also emotional regulation [6].

In the case of preservice primary teachers, the emotional aspect is especially critical at this stage due to, on one hand, the first teaching experiences (that occurs during teaching practices) are emotionally very strong and can be traumatic for future teachers; and on the other hand, we cannot ignore that they usually have negative emotions towards science and teaching science [7] which is another barrier to overcome. Thus, we contribute to the research results of emotions in science education [8] while we give prospective teachers the opportunity to be aware of the emotions they experience [9] when they learn science and about science through an inquiry process [2]. Then, they will be able to reflect and be aware of the emotions experienced to self-regulate them, avoiding being blocked (in the case of negative emotions) when they had to teach science. In addition, as trainers, it allows us to have information about what is being felt in the training that we develop and why.

4. Methods and samples to identify emotions

The subjects participating in the study were 225 students of pre-service primary teachers at the University of Almería. They were selected by a non-probabilistic sampling procedure of convenience, based on the availability of time and of cases.

The instrument used was a semi-open questionnaire designed to identify the emotions that prospective teachers experienced along the annual subject "Science Education". The questionnaire



items were organized in terms of tables of emotions where pre-service Primary teachers had to tick whether they had felt each emotion and when.

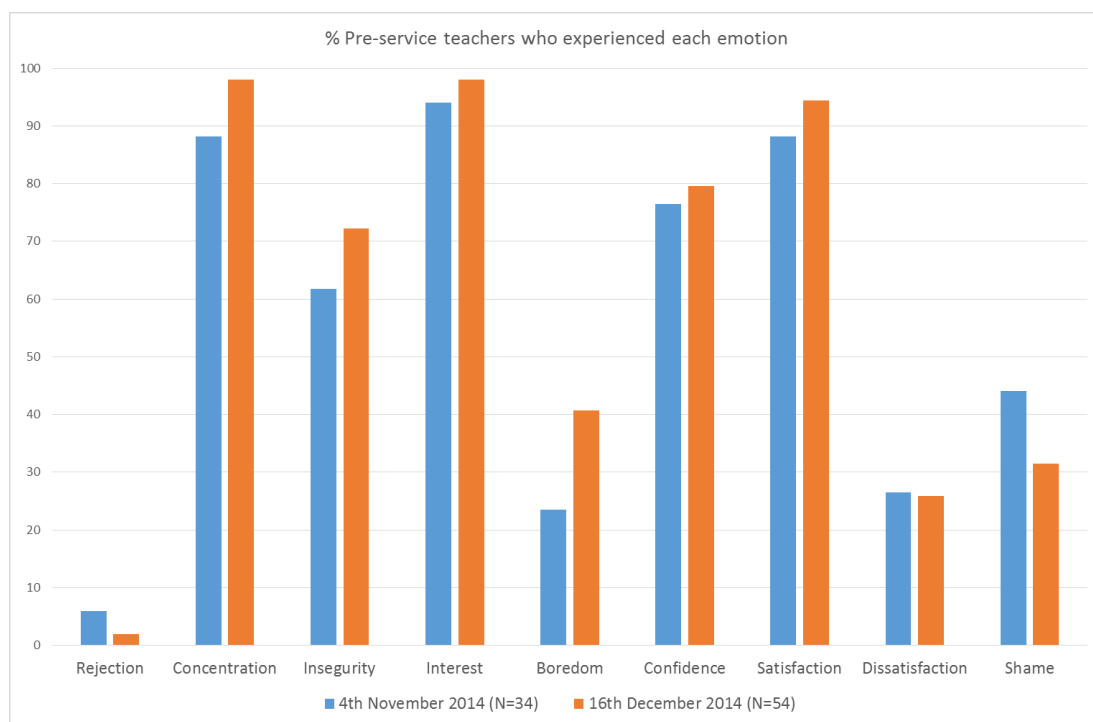
Data were collected during the 2014-2015 academic year, in some key moments of the course: 1.5 months after starting the course (4th November), and one month later (16th December, two days before the first midterm exam). This information allows us, firstly, to identify the emotions generated along the beginning of the teaching-learning process; and secondly, to observe the evolution of the emotions felt and the possible influence of the proximity of the exam.

The resulting data were subjected to the necessary processes of checking and coding to proceed with their descriptive analysis by categorizing the students' responses. In order to respect their responses from the open questions and to be true to their content, the answers analysis involved using an open coding so that the responses were grouped by similarity, being the emerging categories established later. The authors involved in this research have conducted independently a detailed analysis of each response, finding a high degree of consensus among the researchers greater than 83%.

5. Results and discussion

The responses given at different times are represented below.

Graph 1. % Pre-service teachers who experienced each emotion comparison



Graph 1 shows the percentage of pre-service teachers who felt each emotion the first (November) and second time (December) the emotions' questionnaire was implemented. If we compare both, we can perceive a decrease in the percentage of students who felt rejection and shame; while the major increases are found in the percentage of students who recognize to have felt boredom, concentration and insecurity, which may be related to the proximity to the exam.

The analysis of the participants' responses when explaining in what moment they felt every emotion, i.e. the reason why they experienced each emotion is described below. Table 2 shows the different categories emerged from the analysis done, as well as the frequency found and the causes behind their explanations. These responses were categorized according to Borrachero's classification [10]: Teacher [T], Subject [C] or Student [S], represented in brackets in "Category" column and the sum of the total percentages under each emotion in the "Frequency" column.



Table 2. Answers by emergent and Borrachero's categorization

Emotion	Category [Reason] Why?	Frequency % (N=34) [Reasons %] 14-11-2014	Frequency % (N=56) [Reasons %] 16-12-2014
Rejection	-	5,9	1,8
Concentration	<i>In order to be able to understand</i> [S]	47,1	17,9
	<i>The teacher explains</i> [T]	20,6	21,4
	<i>The theme is interesting</i> [C]	8,8	14,3
	<i>You have to explain something</i> [S]	8,8	12,5
	<i>We experience hands on activities</i> [S]	5,9	19,6
	<i>Other</i>	0	8,9
		T= 20.6, C= 8.8, S= 61.8	T=21.4, C=14.3, S=50
Insecurity	<i>Doubt my own knowledge</i> [S]	23,5	10,7
	<i>Conflict with my preconceptions</i> [S]	17,6	10,7
	<i>We communicate our own responses, ideas or questions</i> [S]	17,6	28,6
	<i>I do not understand the teacher's explanation</i> [TS]	0	12,5
		T=0, S=58.7	T=12.5, S=62.5
Interest	<i>We understand</i> [S]	32,4	16,1
	<i>Interesting topics</i> [C]	20,6	16,1
	<i>I ask myself</i> [S]	17,6	16,1
	<i>Due to the teacher</i> [T]	17,6	1,8
	<i>We experience hands-on activities</i> [CS]	5,9	8,9
		T=17.6, C=26.5, S=55.9	T=1.8, C=25, S=41.1
Boredom	<i>We knew what we were learning</i> [S]	5,9	0
	<i>Distraction</i> [S]	5,9	0
	<i>I was lost, I did not understand</i> [S]	2,9	10,7
	<i>Repetitive</i> [T]	5,9	14,3
	<i>The teacher got angry</i> [T]	0	7,1
		T=5.9, S=14.7	T=21.4, S=10.7
Confidence	<i>Because of the teacher</i> [T]	23,5	12,5
	<i>I understand something and I'm aware of that</i> [S]	20,6	37,5
	<i>We are not afraid of being wrong</i> [S]	17,6	8,9
	<i>He knew the subject</i> [T]	0	12,5
		T=23.5, S=38.2	T=25, S=46.4
Satisfaction	<i>I'm learning and I am aware of this</i> [S]	47,1	53,6
	<i>Because my answer is correct</i> [S]	23,5	28,6
	<i>Rewarding</i> [S]	5,9	0
		S=76.5	S=82.2
Dissatisfaction	<i>I do not know something, I'm wrong</i> [S]	17,6	8,9
	<i>I do not understand something</i> [CS]	8,8	12,5
		C=8.8, S=26.4	C=12.5, S=21.4
Shame	<i>I do not know something, I'm wrong</i> [CS]	17,6	16,1
	<i>We expose something</i> [S]	14,7	8,9
	<i>Because of the teacher</i> [T]	8,8	5,4
	T=8.8, C=17.6, S=32.3	T=5.4, C=16.1, S=25	

The most remarkable results show that the mainly concentration' reasons which students recognize to feel is that they focus on *understanding the contents* developed in the classroom, changes when they get closer to the exam; due to they are more concerned with knowing the teacher's explanations, but also because once they experience *hands-on* activities it becomes more remarkable for them.



Students also feel less shame when expressing their ideas (they get used to participate), but they also keep feeling insecure. We can explain it because the proximity of the exam, and because as much we know more aware we are of our knowing-gaps.

The increase in boredom is due to the teacher, which can be explained by the kind of activities developed close to the exam that are focused on reviews, so can be perceived as repetitive.

Furthermore, results show “positive” emotions (*concentration, interest, confidence* and *satisfaction*) are always recognized to be mainly caused by the own proceed of the students, while “negative” emotions (*insecurity, boredom, dissatisfaction* and *shame*) are also recognized to be student-caused except boredom, where the main reason changes from being due to students to be the teacher.

6. Conclusions

The impressions and data from opinion surveys of students can run roughly an indicator of the effect of a training course. So, it is necessary a more detailed analysis that helps us to know what works or not. Therefore, a systematic evaluation linked to the objectives of the course and the use of multiple instruments to triangulate results are needed.

Given the importance of emotions in science learning and teaching, they should be considered in teacher training, to be explicit with the purpose of reflecting and regulating them. For this reason, we have incorporated a questionnaire of emotions and an activity in our training proposal, whose results in two different moments of the course are analysed.

Students’ answers seem to be influenced more by recent feelings or recent events than by the reflection on the teaching process experienced. Thus, if we want to make future teachers reflect on what they felt when they were doing each scientific practice to be conscious and regulate their emotions (what will give us specific information about emotions promoted in each activity) a reviewed and re-structured questionnaire is required.

6. Acknowledgements

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References

- [1] McNamara, C. “Basic guide to program evaluation”, Free Management Library, 2008.
- [2] Martínez-Chico, M., Jiménez-Liso, M. R., & López-Gay, R. “Model-based inquiry for pre-service primary teacher training: science teacher educators’ interview analysis”*las ciencias*, 32(3), 2014, 591–608.
- [3] Viennot, L. “Els molts reptes d’un ensenyament de les ciències basat en la indagació: Ens aportaran múltiples beneficis en l’aprenentatge?”, *Ciències: revista del professorat de ciències de Primària i Secundària*, 18, 2011, 22-36.
- [4] Martínez-Chico, M., López-Gay, R., Jiménez-Liso, M. R., & Acher, A. “Demandas de maestros en activo y materiales curriculares para la enseñanza de las ciencias”,*en la escuela*, 80, 2013, 35–48.
- [5] Otero, M. R. “Emociones, sentimientos y razonamientos en didáctica de las ciencias”, *Revista electrónica de investigación en educación en ciencias*, (1), 2006, 24-53.
- [6] Brígido Mero, M., Bermejo García, M. L., Conde, M. C., & Mellado Jiménez, V. “The emotions in teaching and learning nature sciences and physics/chemistry in pre-service primary teachers”, *US-China Education Review*, 7(12), 2010, 25-32.
- [7] Evagorou, M., Nicolaou, C. T., & Lymbouridou, C. “Using models and SSI as a context of instruction in science: Students’ emotions and engagement”, *European Science Education Research Association*, Nicosia, 2013.
- [8] Sutton, R. E., & Wheatley, K. F., “Teachers’ emotions and teaching: A review of the literature and directions for future research”, *Educational Psychology Review*, 15(4), 2003, 327-358.
- [9] Oosterheert, I. E., & Vermunt, J. D. “Individual differences in learning to teach: Relating cognition, regulation and affect”, *Learning and Instruction*, 11(2), 2001, 133-156.
- [10] Borrachero Cortés, A. B. “Las emociones en la enseñanza y el aprendizaje de las ciencias en educación secundaria”, *Universidad de Extremadura*, 2015.