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Effects of formative assessment on the learning-to-learn skills of teacher training students

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Abstract

This paper presents some of the results of a broader research project on how formative assessment affects the development of specific and generic competences in teacher training subjects at higher education level. The aim of the paper is to describe the impact of formative assessment on the development of learning-to-learn skills, in a sample of 143 students on teacher training bachelor's degrees at the University of Vic – Central University of Catalonia. The results are from a quasi-experimental pre-post study, without a control group and follow-up, that used a quantitative method. Formative assessment was implemented in four subjects of the bachelor's degrees in Teacher in Primary Education (MEP) and Teacher in Early Childhood Education (MEI), in the second semester. At the start and end of each subject, students were asked to complete an ad hoc questionnaire to assess the effect of formative assessment on various competences, including learning-to-learn. The degree of independence and awareness that students perceived about what they had to learn increased significantly, but there were no significant differences in the level of demands on themselves. Therefore, the results suggest that formative assessment could increase students' independence and awareness about learning.

Keywords: Formative Assessment; Higher Education; Teaching; Learning; Assessment.

1. Introduction

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Teacher Training (MIF), promoted by the Catalan Agency for Management of University and Research Grants (AGAUR). The aim of the project was to study formative assessment as a teaching strategy for developing students' generic and specific competences (Ramírez, Pla, Arumí, & Señé, 2015). Among the various goals of the research, the objective of this paper is to present the effect of formative assessment on the development of learning-to-learn skills, and to describe the main strategies used by students to become more autonomous, aware and demanding.

The research was carried out during academic year 2014–2015 at the University of Vic – Central University of Catalonia with a group of seven lecturers on various subjects in the bachelor's degrees in Teacher in Primary Education (MEP) and Teacher in Early Childhood Education (MEI). The lecturers also acted as the researchers. During the first semester of academic year 2014–2015, the lecturers reached agreement on the meaning of formative assessment. On the basis of this definition, they specified the means, techniques and instruments of formative assessment, and finally drew up an *ad hoc* questionnaire to identify pre-post changes. During the second semester of academic year 2014–2015, formative assessment was implemented in some subjects. The concept and methods are described below.

2. Formative assessment in higher education

Brown and Pickford (2013) consider that the expression "formative assessment" is highly controversial and does not correspond to one, commonly accepted concept in the literature. According to the areas of work of the *Red Nacional de Evaluación Formativa y Compartida en Docencia Universitaria* (Spanish National Network of Formative and Shared Assessment in University Teaching), which is coordinated by López-Pastor, formative assessment is a process that forms part of the teaching-learning experience. It is focused on gathering information continuously to generate feedback for students, so that they can modify and make decisions about the learning process, and have the opportunity to improve. López-Pastor (2009) stresses that assessment should be disassociated from the concept of "grading", and instead considered part of the students' learning process. The meaning of formative assessment was the first aspect on which the research group reached an agreement. Two requirements were determined that were considered essential to the implementation of formative assessment. First, feedback had to be provided on assessed tasks, so that students would know that they had improved before they submitted their final assessment tasks (Cauley & McMillan, 2010) . Second, formative assessment meant that students must always be familiar with the assessment indicators before starting a task or providing evidence of learning. According to criteria of the *Red Nacional de Evaluación Formativa en Docencia Universitaria* and specifically a paper by Hamodi, López-Pastor and López-Pastor (2015), the meaning and implementation of means, techniques and instruments of formative assessment were determined, and a document was created to ensure coordination between the lecturers (Arumí, Plà, Ramírez, & Señé, 2015).

As Palacios Picos and López-Pastor (2013) explained, in the last decade initial teacher training has experienced a progressive change in the method used for classroom teaching, in line with the profile of innovative teachers (Pétriz, 2007). Therefore, the aim was to help students to better develop generic skills, and learning-to-learn in particular.

2.1. Learning-to-learn and formative assessment

As explained by Carretero and Fuentes (2012), learning to learn is the capacity to reflect on the way you learn and act accordingly, self-regulating the learning process by using suitable, flexible strategies. These authors consider that learning to assess oneself is essential to learning-to-learn, and therefore students must be given the explicit responsibility for learning.

Hortigüela-Alcalá, Salicetti-Fontseca, Hernando-Garijo and Pérez-Pueyo (2015) proposed that university students need to have experiences that help them to develop the independence needed to learn-to-learn. According to these authors, student independence is a key factor in learning to learn, and is one of the four pillars that should support education in the twenty-first century, as stated in the Delors Report (Delors, 1996). Hughes and Mighty (2010) pointed that teachers should create learning contexts conducive to help students develop essential skills rather than focusing on covering content, so that they can uncover and think over the content for themselves. It is essential to lead students to achieve a personal understanding and create an appropriate atmosphere in where students can share what they are learning in order to develop skills for independent and lifelong learning.

Carretero and Fuentes (2012) identified four main aspects that are directly related with the capacities defined in learning to learn: 1) propose learning objectives, grasp the demands of the tasks, and respond appropriately; 2) use

relevant resources and learning procedures for each situation, plan and evaluate your own activities; 3) control learning processes; and 4) communicate and evaluate what has been learnt.

On the basis of these four aspects, it was decided to study students' evaluations of their level of awareness, independence and demands on themselves in the learning process. At the same time, from a more descriptive perspective, it was considered important to identify learning strategies that are generally used by students to develop awareness, independence and demands on themselves at the start of the subject, and to obtain students' evaluations of the use of formative training techniques to become more autonomous, aware and demanding of themselves at the end of the subject.

3. Research method

The sample was comprised of 143 students: 42 male (29.4%) and 101 female (70.6%) from four subjects in the bachelor's degrees in MEP and MEI. The initial questionnaire was administered during the first class on the subject, and the final questionnaire during the last class. Between the two questionnaires, the lecturers taught the subject and implemented formative assessment.

At the start and end of the subject, students were asked to answer three questions to determine their perceived level of awareness, independence and demands, using a numerical scale (1, none; 10, a lot). At the start of the subject, students were also asked an open question to identify which strategies they used to make themselves more aware, independent and demanding for learning in general. Taking into account the implementation of formative assessment, at the end of the subject students were asked to evaluate on a numerical scale (from 1 to 10) which formative assessment technique had helped them to become more aware, independent and demanding.

Data were analysed using IBM® SPSS® Statistics 21.0 software. To assess the effect of the implementation of formative assessment on learning-to-learn, a student's t-test for repeated measures was performed. Answers to the open questions (qualitative) used to identify strategies were categorized so that they could be entered into a database. Then, a descriptive analysis of categorical variables was carried out (frequencies of multiple response variables). The evaluation of formative assessment techniques was examined using descriptive analysis (average).

4. Results and discussion

The results and discussion are organized into three sections: the first refers to students' levels of awareness, independence and demands; the second to students' strategies; and the third to students' evaluations of whether formative assessment techniques developed awareness, independence and demands during the learning process.

4.1. Effect of formative assessment on the level of awareness, independence, and demands perceived by students with respect to their learning.

Table 1 shows the averages and standard deviations for the level of awareness, independence and demands before and after formative assessment. The columns on the right show the results of the student's t-test for related measures. Results for the level of independence and awareness were statistically significant (t= -7.721, p<0.001; t= -7.813; p<0.001), which indicates that students perceived a greater degree of independence and awareness after the implementation of formative assessment in the subjects. However, there were no statistically significant differences in the level of demands perceived before and after formative assessment (t= -0.821; p=0.413).

Table 1. Students' evaluations of their level of independence, awareness and demands before and after formative assessment*

	Before	After	Differences before and after	
	M (SD)	M (SD)	*t*	*p*
Level of independence in learning	7.16 (1.004)	7.88 (0.952)	-7.721	<0.001
Level of demands in learning	7.79 (0.989)	7.87 (1.115)	-0.821	0.413
Level of awareness of what needs to be learnt	6.81 (1.381)	7.84 (0.879)	-7.813	<0.001

M, mean; SD, Standard deviation; *t,* student's t statistic; *p*(value), degree of significance.
*The evaluation of the degree of independence, demands and awareness was on a scale of 1 to 10.

The results indicate that students' perceived levels of independence and awareness increased significantly, but there were no significant differences in the level of demands. This suggests that formative assessment could enhance independence and awareness, but demands in learning do not depend directly on formative assessment strategies. These results are in agreement with those presented by Zaragoza, Luis-Pascual and Manrique (2009), who observed that formative assessment led to greater independence and better assimilation of learning, that is, greater awareness of assimilated learning and its relevance. Similarly, Buscà, Pintor, Martínez and Peire (2010) found that formative assessment helped to raise students' awareness of the learning process, and to increase their independence and critical reflection.

4.2. Strategies used by students to become more independent, aware and demanding in their learning.

At the start of the four subjects, 52.4% of students indicated that they used strategies to become more aware of their learning, and 65% to become more independent. The main strategies that students said they used to become more aware of what should be learnt were *consulting documents on the organization of the subject* (34.9%), followed by *consulting students who have previously taken the subject* (13.9%). At the start of the subject, students gave higher scores for their perceived levels of independence and demands than for levels of awareness. This result could be related to the use of strategies. Taking into account that the number of male students was considerably lower than the number of female students, the percentage of female students who indicated that they did not use strategies to become more aware was over fifty per cent (53.5%), whilst a clear majority of male students stated that they used strategies (66.7%). However, the most common response by male students when they indicated specific strategies did not fit the question (32.1%), that is, they did not describe clear strategies related to awareness. These results could indicate that the low scores for perceived levels of awareness were due to students failing to identify their own strategies. Students at the start of the bachelor's degree tended to mainly use the strategy of *consulting previous students*, which could indicate that as they progress through the course, they become more independent. In fact, the strategies that students stated they used to increase their independence reinforce this assumption, as a higher percentage of first year students gave responses that did not fit the question (19%, compared to 13.2% and 8.3% in the second year, and 3.2% in the third year).

The main strategies used by students to become more independent were *consulting and expanding knowledge covered by the subject* (54.1%) and *using study guidelines* (31.6%). In terms of actions that students performed to increase demands on themselves, most indicated *being responsible* (49.3%), followed by *having expectations about the results* (25.4%), that is, working to acquire, internalize and understand knowledge, obtain a specific mark or improve your own performance.

These learning-to-learn results suggest that it is a skill that requires shared responsibility. In other words, the lecturer's organization has an impact, as all the documents and structure of the subject is required for students to become more aware of what they have to learn. At the same time, students must assume responsibility to become more demanding in their learning.

4.3. Students' evaluation of the impact of formative assessment techniques on learning-to-learn

At the end of each subject, students were asked to evaluate the influence of each formative assessment technique

on their awareness, demands and independence, using a numerical scale (from 1 to 10). Table 2 shows the evaluation of each technique. Overall, peer assessment was considered the technique with the greatest impact on becoming independent, demanding and, above all, aware of the learning process. Students mainly stated that the self-assessment technique made them more demanding about their learning. They considered that shared assessment was the least influential technique. Students who obtained a *pass* considered that the three techniques mainly influenced awareness. Students who obtained a *merit* stated that peer assessment was the technique with the greatest impact, mainly on awareness and demands, and self-assessment had the greatest influence on becoming more demanding. Therefore, the students who obtained a merit differed from those who obtained a pass.

One consideration that emerges from these results is that peer assessment is the technique that encourages students to become more aware of their learning process. This may be due to the fact students must know which aspects will be evaluated before they can assess an assignment. In turn, this may make the task more demanding. Self-assessment could encourage students to become more aware, but it may also lead to lower demands, as students may tend to justify their own work.

Table 2. Students' evaluation of the influence of self-assessment on learning-to-learn and communication skills and on the social dimension*

		Overall		Mark			
				Pass		Merit	
		M	SD	M	SD	M	SD
Self-assessment	Awareness	7.01	1.687	7.67	1.239	6.80	1.728
	Demands	7.10	1.716	6.96	1.681	7.48	1.432
	Independence	7.08	1.635	7.21	1.285	7.20	1.829
Peer assessment	Awareness	7.86	1.335	7.73	0.884	8.17	1.231
	Demands	7.79	1.196	7.47	0.915	8.14	1.046
	Independence	7.42	1.530	7.07	0.961	7.58	1.811
Shared assessment	Awareness	6.97	1.650	7.22	1.309	7.11	1.847
	Demands	6.92	1.401	6.89	1.183	7.15	1.586
	Independence	6.83	1.688	6.61	1.145	7.26	1.483

*Score on a scale of 1 to 10: 1 is no influence; 10 is high influence.

Acknowledgements

References

Arumí, J., Pla, G., Ramírez, E., & Señé, A.M. (2015). Instrument per a la coordinació del professorat en l'aplicació del treball per competències i de l'avaluació formativa en el Grau de MEI i MEP. *In V Congreso Internacional UNIVEST'15. Los retos de mejorar la evaluación* (pp. 245–249). Girona: Universitat de Girona.

Brown, S., & Pickford, R. (2013). *Evaluación de habilidades y competencias en Educación Superior.* Madrid: Narcea.

Buscà, F., Pintor, P., Martínez, L., & Peire, T. (2010). *Sistema y procedimientos de evaluación formativa en docencia universitaria: resultados de 34 casos aplicados durante el curso académico 2007-2008.* Estudios sobre educación, 18, 255-276.

Carretero, M.R., & Fuentes, M. (2012). *La competencia d'aprendre a aprendre*. Barcelona: Graó.

Cauley, K.M., & McMillan, J.H. (2010). Formative assessment techniques to support student motivation and achievement. *The Clearing House, 83*(1), 1-6.

Hughes, J.C., & Mighty, J. (eds.). (2010). *Taking stock: Research on teaching and learing in higher education.* Montreal: McGill-Queen's University Press.

Delors, J. (coord.). (1996). *La educación encierra un tesoro.* Informe a la UNESCO de la Comisión Internacional sobre la Educación para el Siglo XXI. París: UNESCO.

Hamodi, C., López-Pastor, V.M., & López-Pastor, A.T. (2015). Medios, técnicas e instrumentos de evaluación formativa y compartida del aprendizaje en educación superior. *Perfiles Educativos*, 147: 146-161.

Hortigüela-Alcalá, D., Salicetti-Fonseca, A., Hernando-Garijo, A., & Pérez-Pueyo, Á. (2015). El trabajo autónomo del alumno universitario en las clases de educación física. Análisis de su percepción sobre la práctica. *Ágora para la EF y el Deporte.* 17(3), 251–265.

López-Pastor, V.M. (Ed.). (2009). *La Evaluación Formativa y Compartida en Docencia Universitaria*. Madrid: Narcea.

Palacios Picos, A., & López-Pastor, V. M. (2013). Haz lo que yo digo pero no lo que yo hago: sistemas de evaluación del alumnado en la formación inicial del profesorado. *Revista de Educación*, 361, 279–305.

Pétriz, F. (2007). Estrategias para el cambio metodológico en la universidad española. *La Cuestión Universitaria*, 2, 15-27.

Ramírez, E., Pla, G., Arumí, J., & Señé, A.M. (2015). L'avaluació com a estratègia docent per al desenvolupament de les competències en els graus de MEP i MEI. In *V Congreso Internacional UNIVEST'15. Los retos de mejorar la evaluación* (pp. 232–238). Girona: Universitat de Girona.

Zaragoza J., Luis-Pascual, J.C., & Manrique, J.C. (2009). Experiencias de innovación en docencia universitaria: resultados de la aplicación de sistemas de evaluación formativa. *Red-U. Revista de Docencia Universitaria,* 4.