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Feedback images in university teaching

Immagini-feedback nella didattica universitaria

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Abstract

This contribution seeks to draw attention to the management of visual feedback processes to promote active learning within the scope of university didactics. Specifically, the focus is on the production of feedback-images by the students in e-learning platforms, with particular reference to their impact of learning and on the motivational dimension. For this purpose, an experimentation is presented within an e-learning university training pathway, finalised to understanding how feedback of a visual nature can support from the cognitive, socio-relational and emotional point of view the students' learning processes.

Keywords: feedback; e-learning; images; motivation; sense-making.

Sintesi

Questo contributo vuole fermare l'attenzione sulla gestione dei processi di feedback visivi per promuovere apprendimenti attivi nell'ambito della didattica universitaria. Nello specifico, il focus è rivolto alla produzione di immagini-feedback da parte degli studenti all'interno di piattaforme e-learning, con particolare riferimento al loro impatto sull'apprendimento e sulla dimensione motivazionale. A questo scopo viene presentata una sperimentazione effettuata all'interno di un percorso formativo universitario e-learning, finalizzata a comprendere come i feedback di natura visuale possono sostenere da un punto di vista cognitivo, socio-relazionale ed emotivo il processo di apprendimento degli studenti.

Parole chiave: feedback; e-learning; immagini; motivazione; costruzione di significati.

[1] This contribution, developed and shared jointly by the two authors, was drawn up as follows: paragraphs 1, 2 and 3 by Chiara Panciroli, and paragraph 4 by Anita Macauda. The paragraph 5 was developed together by the two authors.

1. Theoretical framework

The recent scientific literature highlights how (Ajjawi, Molloy, Bearman, & Rees, 2017; Gan & Hattie, 2014; Hattie & Timperley, 2007; Nelson & Schunn, 2009; Rand, 2017; Thurlins, Vermeulen, Bastiaen, & Stijnen, 2013; Thurlings, Vermeulen, Kreijns, Bastiaens, & Stijnen, 2012; Voerman, Meijer, Korthagen, & Jan Simons, 2012) in the educational field feedback is a key factor in the development of the learning process and focuses on two main types of action:

- how to provide feedback;
- how to manage feedback processes.

In this regard, the distinction of Winstone and Carless (2019) between traditional paradigms transmission-focused and new constructivist, collaborative and interactive paradigms is significant. The former refers, according to a cognitive approach, to the teacher's action in providing pertinent information to the students about the learning results achieved (Ajjawi & Boud, 2017). The new paradigms, instead, referable to a socio-constructivist approach, presuppose the development and the monitoring of the interaction and the feedback during the whole learning pathway in order to support in the student processes of active learning and sense-making (Askew & Lodge, 2000; Barton, Schofield, McAleer, & Ajjawi, 2016; Henderson, Ajjawi, Boud, & Molloy, 2019). In the specific case of the cognitivist approach, feedback represents for the teacher one of the main strategies at the service of the evaluation of learning, containing information on the quality of the results contained by the student in a task, corrective indications for the execution of an assignment, comments and explanations relating to the result obtained in respect to the expected one (Calvani 2014; Hattie, 2009; Tacconi & Gentile 2017). In this case, the effect on learning is greater when the learning or correction-based feedback provides indications to improve the execution of an activity/task. Laurillard (2012) calls it extrinsic feedback, in that it is external to the action of the student; it takes the shape of an evaluative comment or a guide that the student can follow to improve his/her performance in respect to the expected results. This feedback practice, which is very common among teachers, is fuelled both by a consolidated system of beliefs and values and by factors such as the excessive workload, the large number of students in the classroom and the pressure exerted by the satisfaction/gratification questionnaires filled in by the students. There is a tendency, therefore, to emphasise mostly, according to a one-directional communication, what the teachers do in terms of comments/indications/corrections, overlooking instead the feedback that the students can return to the teachers in regard to their own learning process. Indeed, if it is true that the corrective or extrinsic feedback focuses mainly on the inputs (information or comments given to the students), the outputs produced by the students via a continuous process of interaction with the teacher and with their peers represent an equally significant feedback. In fact, between input and output there is a close relationship in that a system's output depends on the nature and the quality of the input. The comments that the students receive on their work or learning positively impact the process sense-making and are a fundamental prerequisite for the subsequent of meanings (Carless, 2015; Winstone & Carless, 2019). In this sense, a feedback that, according to a socio-constructivist approach, is oriented to learning and to output, puts the attention on how the students generate, produce sense and use the feedback for a continuous improvement, sustaining the development process. Laurillard (2012) speaks of intrinsic feedbacks that do not require the instructive intervention of the teacher and are the natural consequence of the student's actions; internal feedbacks to the actions themselves, based on processes of a perceptive and active nature (Narciss, 2008; Pellerey, 2014; Sansone & Harackiewicz, 2000). The value of the intrinsic feedback is well defined as a crucial element for learning

because it allows the student to progress gradually in the achievement of the goal with reference to a constructivist learning model, situated and experiential. The learning process is regulated by successive feedbacks that impact on actions/experiences and require a continuous teacher-student training interaction. This practice is based, in an interactionist perspective, on the management of generative feedback processes (Rossi, Pentucci, Fedeli, Giannandrea, & Pennazio, 2018) that assign students an active role so that they can build and implement their own knowledge, acting on the cognitive, socio-relational and motivational levels within a complex interaction of intrapersonal, interpersonal and contextual influences (Clark, 2012; De Beni & Moè, 2000; Fishman & Dede, 2016; Gan, Nang, & Mu, 2018; Schunk, Pintrich, & Meece, 2008).

2. Feedback and motivation

Several sector studies show how feedback processes are closely linked to the motivational dimension of learning (De Beni & Moè, 2000; Fryer & Bove, 2016; Gan et al., 2018; Murtagh, 2014; Schunk et al., 2008). In learning processes, motivation appears stimulated by different factors interacting with each other:

- the proposed topics that draw the students' interest in that they connect prior knowledge or real-life experiences, *resonating* with the socio-cultural contexts of belonging;
- the student's active involvement in the search and construction of knowledge;
- the creation of forms of collaboration and cooperation, capable of fostering the respect for individual differences, the sharing of resources and the participation of all the actors in the realization of a common project;
- the choice of didactic strategies and languages (verbal, gestural, visual, audio-visual, etc.) that play a strategic role in the development and the maintenance of the motivation to learn;
- the valorisation of the affective-emotive and relational components implied in learning.

The motivation is thus positioned in three fundamental dimensions: *cognitive, socio-relational and emotional*. In this regard, the studies by Keller (2010; 2016) highlight the critical aspects detected by the teachers in the construction and sustenance of motivation in the classroom, with particular reference to the following questions: how to exert a significant influence on students' motivation; how to systematically stimulate and support the students' motivation; how to identify and adopt didactic languages and strategies apt to motivate the students. According to the model honed by Keller ([theoretical model ARCS] 2010; 2016), it is possible to distinguish four categories of motivational variables: *attention*, *relevance*, *confidence* and *satisfaction.* The first condition required of the teachers is *attention* which refers to curiosity, stimulation and interest. *Relevance* refers to the coherence of the didactic goals of teaching with the students' learning styles and their prior experiences. *Confidence* recalls the expectations of success in relation to one's own capacities/competencies. The fourth condition required, *satisfaction,* includes the appropriate combination of intrinsically and extrinsically gratifying outcomes that support desirable learning behaviours. In this regard, the studies that hinge upon systems of *self-regulation* that guide learning, highlight the relationship between metacognitive and motivational strategies. The reference is both to intrinsic motivation, *natural source of learning and realisation* that is triggered by causes internal to the subject, connected with

the student's spontaneous sense of satisfaction; and to the extrinsic motivation, generated by causes external to the individual tied to the achievement of a given reward (Boscolo, 2012; Levesque, Copeland, Pattie, & Deci, 2011). In this sense, managing the feedback processes recalls the need to support the motivational dimension of learning, specifically defining which motivational factors are to be impacted.

3. Feedback and visual intelligence

Literature on the topic shows that, with reference to the motivational dimension, students' approach to the disciplinary contents turns out to be more significant when information is provided via the integrated use of different visual languages (images, video, diagrams, graphs, etc.) (Benedek, 2017; Cicalò, 2016; Martínez-Arboleda, 2018; Panciroli, Corazza, & Macauda, 2019; Raiyn, 2016; Stašák, 2011). The visual information is, in fact, mapped in the minds of the students (Williams, 2009) who learn better when a visual approach to the didactic contents is privileged. In the processes of cognitive acquisition and re-elaboration, the visual recalls the possibility to stimulate and activate foreknowledge that is adequate to the learning objects and to develop the capacity to problematize the contents proposed with reference to complex contexts. In a multimedia and multimodal perspective of the educational experience, digital technology – video, interactive digital media – have multiplied and promoted new approaches oriented to visual thinking, on the grounds of which learning becomes more significant when ideas, words and concepts are associated to the images (Brumberger, 2011; Calvani, 2011; Kress, 2009; Lacelle, Boutin, & Lebrun, 2017; Landriscina, 2012; Lumbelli, 2012; Panciroli, 2019; Serafini, 2014). Specifically, "the visual metaphors have become, owing to the diffusion of mobile communication tools, the dominant form of communication and […] a potential learning method for the young generations" (Benedek, 2017, p. 4). The images represent, therefore, a motivating mediator, particularly effective for stimulating and improving students' learning. In regard to the multiple intelligences theories articulated by Gardner (1983), visual intelligence defines the cognitive abilities tied to imagination and to the capacity to *think by images* that is to mentally portray the concepts, even before verbalising them, allowing one to make an immediate experience of the world (Cicalò, 2016; Robertson, 2003; Fiorentino, 2018).

The production/use of an image promotes the student's motivation allowing him/her to activate cognitive and explorative processes, those of categorization, memory, prediction, understanding, emotion and empathy. In this regard, Clark and Lyons (2010) identify some functions of the images concerning attention, the activation of knowledge, the minimization of the cognitive load and the support to motivation. In particular, the images can exert a function of mediation, anticipation and modelling vis-à-vis knowledge (Rivoltella, 2012). In this sense, the processes of acquisition and re-elaboration of the knowledge are tied not only to the vision of the images of the world but also to the representation of the world by images. The image is thus understood both as a product that presupposes an activity of reading, comprehension, interpretation and re-elaboration of meanings, and as a process with regard to the construction and diffusion of new semantic contents. Within the scope of a self-regulated and motivating learning model (Hattie & Timperley, 2007), by means of the images the students generate and use feedback actively, building new sense networks (Rivoltella & Rossi, 2019). Hence, in a significant learning process it is necessary for visual intelligence, motivation and feedback to be interconnected (Figure 1).

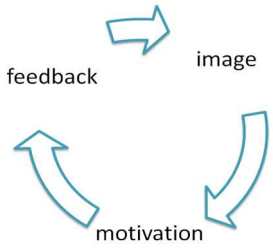

Figure 1. Learning process.

4. Research context and results

4.1. Presentation

The experimentation involved 247 students of the Intensive Socio-Pedagogical Professional Educator course, provided by the University of Bologna in the academic year 2018-2019. The course was addressed to educators already working, with a professional experience in the social sector for at least three years and without a specific diploma. This course was realized in the blended learning mode (30% in attendance; 70% distance) and led to testing an integrated use of physical and digital environments (university teaching rooms and e-learning-Moodle platforms) in which to develop and support the feedback necessary to foster the students' knowledge-building processes. This allowed the teacher and the students to use direct (in attendance) and indirect (distance) feedback, managed synchronously and asynchronously.

4.2. Research question

The research question refers to the functionality of the image/feedback in the classroom and in particular to the relationship between experiences of visual feedback and learning motivation. Do the feedback-images allow the teacher to monitor the students' learning processes, supporting their motivational dimension?

4.3. Phases

The experimentation envisaged three development phases:

1. the assignment of stimuli images/video on a given theme (input);
2. the study of the materials (book chapters, articles and other video resources) made available on the platform;
3. the production of images/feedback (output) starting from a specific task.

By way of example, here is one of the activities proposed: "After studying the materials within the platform, search for one or more images about the elements of the didactics that you feel are particularly significant in your professional context and give reasons for your choice".

The activity was completely developed on the platform starting from the stimuli-images, which was followed by the development of the didactic material which provided the concepts and the key elements for the realisation of the individual visual productions, used by the students as feedback with respect to their own learning process.

4.4. Methods

A qualitative analysis was carried out through content-based comparison tables of images/feedback and related comments and an anonymous survey with closed and open-ended questions was given to all students.

4.5. Results

One thousand four hundred and forty images were collected and analysed bearing in mind the cognitive dimensions of learning. In short, the acquisition of basic alphabets; construction of the semantic connections; personal re-elaboration of the concepts.

Figure 2. Three typologies of feedback images.

From the reading of the data it emerged that the image was particularly important and impactful vis-à-vis the possibility to connect abstract concepts to experiential aspects of a professional nature creating strong connections between theory and practice. Hence, from the analysis performed, it was possible to distinguish three typologies of feedback images that underpin the processes of a cognitive nature, namely:

- image as anticipator with informative and stimulator function with respect to the basic knowledge (basic literacy monocognitive dimension);
- image as consolidator which represents one or more moments of one's won professional experience to deepen some theoretical elements, creating specific connections (reflective metacognitive dimension);
- image as dilator, also via the use of the metaphor, which is used to re-elaborate in a personal and original way concepts that, when applied to the professional context, have been deemed to be particularly meaningful (expressive creative fantacognitive dimension).

Twenty-two per cent of the images/feedback can be traced back to the first monocognitive typology; 36% to the second metacognitive one; 42% to the third fantacognitive one.

By way of example, in the two tables reported here, for each typology three images and the related comments have been reported (Figure 2 and Figure 3).

Almost at the end of the course, the students were given a compulsory satisfaction questionnaire in anonymous form, with closed and open-ended questions particularly focused on the training pathway offered and on the choice of the contents on the platform. The collection and analysis of the images/feedback has led to the formulation of some explicative questions with respect to the perception of the impact of the visual dimension in the learning process, with particular reference to the motivational dimension.

First type: image as anticipator	"I appreciated the image that represents the elements of teaching with the material available in any pencil case of a primary school child".
	"I liked the image that portrays the recording studio in the middle schools […], the place that represents my teaching activity and that of disseminator of knowledge".
	"I think that the image representing a primary school classroom where I work prepared for the reception and inclusion of the minor. I have been helping for three years is particularly significant".
Second type: image as consolidator	"The photo represents a moment of in-class activity using the strategy of cooperative learning […]".
	"In this image I wanted to highlight the learning through experience and collaboration so that it could be supported by a conscious participation of the subjects […]".
	"This photo represents one of the final moments of a workshop on digital skills, carried out after school hours in one of the most multi-ethnic areas of the city".
Third type: image as dilator	"I chose the image of the tower, because I feel that it is emblematic to describe the work we are doing: a tower is hard to build because it defies gravity as it goes upwards but when it is finished, how satisfying it is! Each brick is different from the other and all of them are important in the same way because if only one of them were missing then the tower would collapse. […]. These bricks for me are all the actors who come into play int the educational-didactic pathway".
	"I chose this image because inside it I first of all find the concept, fundament for me, of experience, of learning by doing, learning by enjoying oneself and of the experience made by actions that gradually foster the acquisition of knowledge".
	"In the black and white photo the profile of a person stands out, half made up of trees, plants (perhaps a forest) and half made up of a void that goes deep down almost as far as the heart. It is a free space that allows for an exchange of thoughts and emotions, which takes on and change shape. I don't imagine that this profile is necessarily my own. I think instead to those who work with me (operators and users) as figures in phases of evolution who each time are guided and guide me at the same time towards new strategies within a mindset of reciprocal learning".

Figure 3. Comments for each typology of images.

From the questionnaire it emerged in a significant way that the use of the images was believed to be among the activities most functional to stimulating learning (Figure 4) and to supporting motivation (Figure 5).

Functional images in terms of learning	**%**
Strongly agree	57%
Somewhat agree	39%
Hardly agree	4%

Figure 4. Images and learning.

Functional images in terms of motivation	**%**
Strongly agree	68%
Somewhat agree	27%
Hardly agree	5%

Figure 5. Images and motivation.

In this regard, the comments/suggestions provided by some students are of particular relevance:

- "I think that the images/document are functional and stimulating in the acquisition of the contents envisaged by the different modules";
- "The images are both the source of stimuli for analysis and the source of powerful reflections on my daily educational practice";
- "I would increase the teaching through visual stimuli that in my opinion would help to consolidate the contents".

Furthermore, by intersecting the variable *typology of image/feedback*, with the variable *cognitive level* it has been possible to highlight the relationship with a further variable: the *motivational level*.

Starting from the data emerging in the questionnaire, Figure 6 shows how the typology of image that motivated most of all was first and foremost that with the *dilatator* (metaphor image) function, because it allowed us to add meanings and to re-articulate the knowledge in an original way in close connection with the professional context of provenance; next comes the one with the function of *ancitipator* (stimulus image) which allowed us to capture the students' interest with respect to the arguments being dealt with.

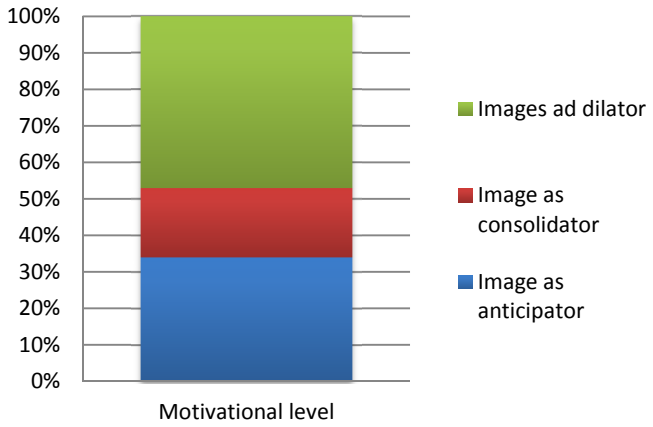

Figure 6. Images and motivation level.

4.6. Discussion

The experimentation highlighted how the image-feedback was used by the students to create connections between the proposed educational contents and their own professional experiences. Indeed, as compared with a verbal account, the image has turned out to be a particularly meaningful device in that it is evocative and narrative of the professional contexts, allowing one to see and not just listen to one's own experiences (Ajjawi et al., 2017). In this sense, the possibility to transfer aspects of professionalism within didactics through a feedback image, has been perceived by the students as a particularly motivating element. In fact motivation has become elevated and particularly significant precisely for the role acknowledged to the image of bringing the experiential context close to the classroom context (Keller, 2016; Murtagh, 2014). The vision/production of an image has thus given the students the chance to articulate feedback with a high level of personalisation with reference to the prior knowledge and the professional experiences and has contributed significantly to the learning process (Raiyn, 2016). Specifically, the feedback images have allowed:

- the students to connect new knowledge and professional experiences, with a significant impact on the intrinsic motivational dimension;
- the teachers to receive feedback *in itinere* in respect to the students' learning process.

5. Conclusions

From this initial experimentation on the use of feedback-image within a university e-learning pathway it transpired that images are fundamental devices capable of significantly impacting the cognitive processes as well as motivation. Specifically, the analysis of the relations between the feedback-images produced by the students and their learning motivation, according to a self-regulated system managed on the e-learning platform, has shown some transformative elements. According to a constructivist and problematic approach:

- the feedback is no longer understood as a corrective comment but as sense-making;
- the feedback image shifts the focus of the activity from the teacher to the student's activity;
- the students do not just receive comments but re-elaborate meanings through images and comments and build new knowledge.

The images produced by the students provide the teacher with feedback-images capable of creating meaningful connections between the reflections on their own professional experience and the original production of knowledge, arousing and keeping up the motivation. Indeed, the images understood as a process and not as a product, transform the students from containers of information into active learners, in turn generators of feedback.

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