

# Supporting teachers' self-reflection and professional development with gamification

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**Abstract.** The paper deals with a gamified approach developed to support teachers' reflection and awareness on a set of specific behaviours that can support informal learning. The approach adopts a metaphor, vegetable gardens to be grown, to represent the teachers' participatory practice and is enriched with specific game mechanics (tasks, goals and badges). The metaphor was reified in two different modalities: paper-based and digital. The approach was preliminary tested with two groups of teachers.

**Keywords:** Teacher professional development (TPD), gamification, practice-based learning, awareness.

## Introduction

In the literature some authors claim teachers' professional development is highly informed by practice [1]. Thus, learning opportunities for teachers would lie mainly in their work and in everyday interactions with students and colleagues. However, teachers often work in isolation with limited sharing and collaborating with peers, which support the claim that they need to develop further a participatory culture [2].

To nurture teachers' capacity to work with colleagues and share their practices, we propose to support their awareness and reflection on a set of desirable behaviours that can enhance their professional learning by increasing their participatory skills.

Our proposal is grounded in the framework proposed by Littlejohn [3], which describes how informal learning takes place within communities of knowledge workers. In the proposed framework, Littlejohn and colleagues [3] focus on the behaviours of knowledge workers, while they interact within their personal learning network, or community, at work. In particular, they identify four key behaviours typical of informal networks, called the 4Cs behaviours:

- Consuming knowledge created by others, by accessing sources of knowledge wherever they are;

- Creating new knowledge, by amending, extending and structuring existing knowledge. This is a continuous, often collaborative sense-making process that generates new collective knowledge;
- Connecting with people and resources within one's personal learning network, by sharing experience and ideas, providing support to others or collaborating with them. Connections can be local or global, two-ways or one-way, occasional or systematic;
- Contributing new knowledge, by offering the results of one's knowledge creation to the members of the network.

Persico and colleagues [4] have already instantiated the 4Cs behaviours to the case of educators, by exploring the interplay between teachers' professional practice and their self-regulated learning (SRL) capacity. In the paper, the authors conclude that awareness of participatory mechanisms "is highly desirable because, not only would it improve SRL, but it would transform the pioneer teachers into fully fledged researchers able to increase not only their own knowledge, but also the knowledge of the community of practice they belong to". This paper furthers this line of work by proposing an approach to foster awareness of the 4Cs behaviours and, hopefully, increase the participatory culture among professional teachers.

### **A gamified approach to support teachers' awareness and reflection on their participatory practice**

To support teachers' awareness and reflection on the 4Cs behaviours, we propose to adopt a gamified approach. The approach is intended for groups of teachers working together during workshops or in any other practice-based opportunity (online or face to face) where teachers work in groups. The experience needs to be led and mediated by, at least, an expert to guide teachers through it.

According to Deterding, gamification refers to the selective incorporation of game elements into an interactive system without a fully-fledged game as the end product [5-7]. Following Zicherman and Cunningham [8], game-design elements comprise game mechanics (like scoring systems or badges) and dynamics (the effects of the mechanics on the subjective user experience over time [9]).

The application of gamification in education and training has raised criticisms, since there is a tendency to use a points-based approach to trigger learners engagement and external motivation by means of rewards [10]. The limits of this kind of approach seems to lie in its supposed motivational power, because the literature about motivation in education stresses that the focus should be on facilitating people's understanding of the importance of what they are doing and, thus, favouring the internalization of its regulation so that learners are motivated to perform a specific action or behaviour [11].

Our approach aims to go in this direction and is in line with the vision proposed by Craven [12] for whom gamification in education should imply the configuration of the experience in a manner that enables reflection, analysis and insight to occur.

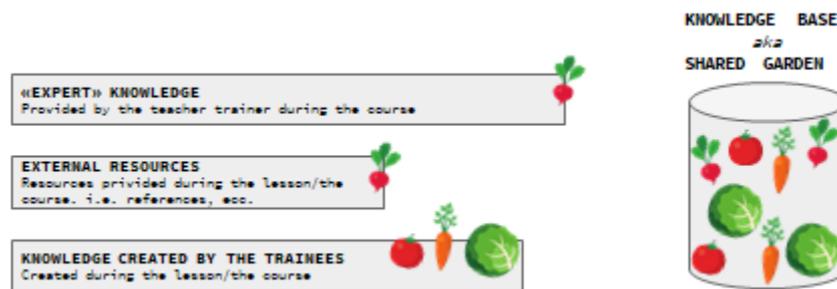
In the approach we propose, specific desirable behaviours (the 4Cs behaviours) are linked with the progression in the gamified experience, which is based on a metaphor of group and community gardens to be enriched (described below), rather than points to be acquired.

According to the model proposed by Blohm & Leimeister [13], we pursued two motives (social exchange and achievement) through group tasks and badge awarding. The dynamics triggered by the implemented mechanics were collaboration and collection.

### The metaphor

For our purposes, we have adopted the metaphor of the vegetable garden, which is a fertile ground that needs to be planted and taken care of, and we have developed a narrative around this metaphor.

We envisage several gardens (one for each group of teachers) as well as a shared garden for the whole community. In our metaphor, knowledge is represented by vegetables: knowledge produced by each group is represented by a specific type of vegetable (carrots, tomatoes, etc.) and knowledge coming from the expert or from external sources is represented by radish (see Fig. 1).



**Fig. 1.** Knowledge representation in the garden metaphor.

A single vegetable can represent knowledge at different levels of granularity: a single resource or an idea created/consumed/contributed or connected by a group of teachers, or something more complex.

In the metaphor, the 4 desirable behaviours (Consume, Create, Connect and Contribute) are represented by actions teachers carry out in the gardens:

- Consume is represented by moving a vegetable from the shared garden to the group own garden and consists in a group making use of knowledge items available in the common garden.
- Create is represented by adding a new vegetable in the own garden (a carrot in the carrot garden, etc.) and consists in the group producing a new item of knowledge.
- Connect is represented by connecting two (or more) vegetables in the shared garden and consists in two or more groups communicating around an item of knowledge

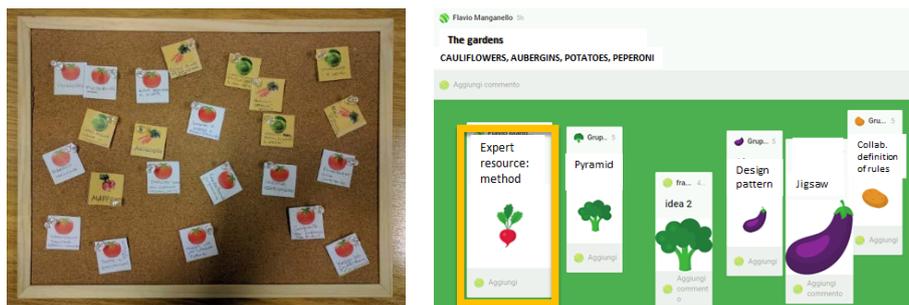
- Contribute is represented by moving a vegetable from the own to the shared garden and consists in a group making available an item of knowledge to the other groups.

This metaphor, therefore, visually represents the 4Cs behaviours of the teachers by displaying the knowledge made available by each group and /or by the whole community.

### Reifying the metaphor

In order to reify the metaphor, we have experimented two different modalities: reification through paperboards and cards, with a first set of teachers, and through digital boards and padlets, with a second set (see Fig. 2).

The two different modalities have been tested in similar contexts. The game mechanics in the two versions were the same; the two versions were developed and experimented to understand whether and to what extent teachers showed any preference regarding using tangibles in respect to digital objects. However, the preliminary data reported in this paper do not compare the two sets, rather, they provide information about the opinions of the involved teachers about the effectiveness of the metaphor used.



**Fig. 2.** Tangible version of the garden (left part) and digital version of the garden (right part)

In any case, the proposed narrative puts teachers in the role of farmers, who have the scope of growing their own group garden with different vegetables and, at the same time, to grow the shared garden. While working in groups to carry out a task during a workshop, teachers discuss and – in doing so – they create, consume, contribute knowledge and connect with other groups about a piece of knowledge. For each of these 4Cs actions, teachers are required to add the related cards to their boards (paperboards or tablets), so that during the workshop the various gardens would gradually be enriched with the vegetables planted by the groups.

To further support mutual exchange among groups, each group is invited to choose one ‘connector’ (i.e. a member of the group) in charge of collecting knowledge from the other groups and coming back to the group bringing the knowledge from the others.

At specific moments of the workshop, time is devoted to observing (in plenary sessions) the gardens (paperboards or digital boards) and the ways they were evolving

through time, with the aim of supporting teachers' reflection on the practiced 4Cs behaviours: vegetables observables in gardens reveal behaviours put into practice by single groups and by the community as a whole.

To conclude the process, at the end of the workshop/working session, groups are awarded badges, according to the most practiced behaviour. Such badge assignment have the scope of increasing teachers' self-awareness about their 4Cs behaviours. In this way, groups can set their goals, session by session, to collect the whole set of badges or just free to reflect on their behaviours.

## Preliminary results

Teachers filled in an end-of workshop questionnaire about the proposed gamified experience. In the following, some preliminary results are reported. The sample was composed of 34 teachers of upper secondary school, 10 teachers used the paper version, 24 the digital one.

Teachers were asked to rate their level of agreement about some statements on a scale from 1 (Completely disagree) to 5 (Completely agree). Quartiles were calculated for each question using SPSS<sup>1</sup>.

Results are reported in the table hereunder (Table 1)

**Table 1.** Perceived usefulness of the vegetable garden metaphor (Quartiles)

Statement: "The garden metaphor was useful for..."	25°	50° (median)	75°
Stimulating reflection on the use of ideas and resources (made available by trainers, colleagues). [Consume]	3	3	4
Stimulating reflection on new ideas generation in my group or ideas/resources adaptation. [Create]	3	3	4
Stimulating reflection on the importance of discussing ideas with colleagues. [Connect]	3	3,5	4
Stimulating reflection on the importance of sharing ideas with colleagues [Contribute]	3	4	4
Stimulating reflection on the ongoing process of professional development	3	3	4

As shown in Table1, teachers gave a moderately positive evaluation of the support provided by the gamified approach to reflection about the different behaviours considered (4Cs) and, in general, about the process of professional development they underwent. Medians are higher than the central value for the behaviours "Connect" and "Contribute".

<sup>1</sup> Statistical Package for Social Science (<https://www.ibm.com/analytics/us/en/technology/spss/>)

## Conclusions

As already mentioned, recently the gamified approach was proposed and tested during a teacher training initiative and delivered to two communities of teachers. During the experience, the approach was reified through a paper based version of the approach as well as a digital version. The preliminary results reported here do not distinguish between the two versions, rather, they provide a preliminary feedback on the acceptance of the approach by the teachers. A first analysis of the reported data reveals positive results in terms of perceived usefulness of the gamified approach proposed to support reflection and awareness in respect to the behaviours enacted. Results are encouraging, considering that the approach is still under study and, of course, will benefit of a more in depth evaluation.

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