GUIDELINES FOR ENHANCING DIGITAL CREATIVITY IN TEACHER EDUCATION

Summary

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* About

This document addresses to educational practitioners (teacher educators, as well as pre-service and in-service teachers) that are aiming to integrate digital creativity in their daily teaching practices. The set of guidelines is summing up the key findings from the implementation phase of DoCENT project, where teacher educators designed teaching scenarios, following the DoCENT Framework[1] for Digital Creative Teaching and used them in authentic teacher training situations. The aim of this short document is to be graspable to the reader, figurative, comprehensible and informative, in order to be used by education practitioners, on the spot, to design and carry out their teaching interventions.

* Guidelines to set up and implement a digital creative course referring to

the process of designing and implementing a teaching/learning scenario	the individual characteristics of the educator and/or students
the environment in which the teaching/training takes place	the product/construction/outcome of the educator and/or students

Planning (before the teaching/training intervention – making the scenario)	
✓ Make a detailed scenario, an extensive description of your teaching/training intervention. Include the "orchestration" of the classroom, the roles of educator (who is probably you) and the students, the tools that will be available, the added value of the scenario that documents the benefit of the use of digital tools, the teaching/learning goals, etc. ✓ In your scenario describe the phases of teaching/training process. Write down what you are expecting from the students to do. ✓ Design task that require collaboration among the students. ✓ Show your scenario to a colleague, asking for his/her review. Do not necessary choose someone that you share the same pedagogical, or epistemological perspectives. Find someone that will not have scruples about underpinning the weak points of your scenario.	✓ Think of the criteria that you will use to arrange the group of students, in order to collaborate, during teaching/training. ✓ Avoid putting in the same group only students with the same expertise (i.e., only students that are very capable in coding). ✓ Through the synthesis of the groups, try to provoke argumentation among students with diverse thinking styles. ✓ You could plan to use digital environments, like decision making games, not only to foster students' decision making skills, but to promote openness and flexibility as a way of addressing real life problems.
✓ In your scenario describe in detail the ecology of the classroom; i.e., where and how the students are going to work? Are they working in groups? What kind of digital artifacts they are using? ✓ Be and act "in the field" (i.e. the classroom, the PC lab) while designing the scenario, to see if what you are planning is feasible. ✓ Use digital resources that are accessible for students,	✓ In the scenario, describe in an articulate manner, what you are expecting from the students to produce. At the same time, mind that your description should allow students to express themselves through making; it should not be inflexible and rigid. ✓ Act proactively, including a phase where students are exchanging draft versions of their products, relatively early in the flow of activity, in order to have time to

[1] The DoCENT Framework defines the key-components of competences needed by educational practitioners for effectively integrating digital creativity in teaching contexts. Furthermore, it provides and validates a EU reference model for developing and evaluating digital creative teaching competences.

and easy to find and use them outside classroom.

- ✓ Do not hesitate to modify the environment of the classroom or the place that the teaching/training is going to take place, in general, in order to make the tasks accessible and the available tools useful to the students.
- ✓ Transform the digital tools that students are going to use, in order to be appropriate for their activity.
- ✓ Do not use only tools that are related with the discipline or the subject related to the scenario, but search for tools to facilitate communication and collaboration in the classroom as well (i.e. use threaded forum discussions, and/or "cloud" for the sharing digital artifacts).
- ✓ Design tasks that are challenging for students. Engage them to exploration in a realistic setting that refers to their sphere of interest.
- ✓ Be proactive with respect to the number of students in each group. The available digital tools should be enough for all students to participate and adopt an active role in the group; i.e. in the case of each group is supposed to use a PC (in the PC lab), then four students are too many, whilst two are hardly a group.

reflect and improve them.

- ✓ Try to make yourself what you are asking students to create. Keep notes of the difficulties you met and reflect on them; will these difficulties have added value for students if they face them too, or not? You might revise some parts of your scenario, depending on you answer.
- ✓ Apart from the product of the students, there is another product/outcome that you are responsible to carry out; the teaching/learning outcome of the scenario. Define/construct in advance the criteria for the evaluation of this outcome. Hence, determine what kind of data from the implementation phase, will be necessary in order to make such an evaluation. I.e. a criterion that you could construct and use could be "the density of reflection" in a group of students. In this case, useful information could be "how many different elaborated versions of the product of the same group have been created".
- ✓ Plan to use suitable digital tools that will help you document and evaluate the outcome of your intervention. I.e. if the "density of interaction among groups of students" is a criterion for evaluating the outcome, then you should have well-documented the discussion procedure. In this case, using a digital environment that supports communication among students, in which all discussions will be documented, should be useful.

Performance "in the field" (implementation of the scenario)

- ✓ Give time and space for students to express themselves. For example, if the available time of your intervention is 60 minutes, then do not use more than 5 minutes in the beginning of lesson/training talking without not even giving students the chance to take a look to the available tools that they are going to use.
- ✓ Have in mind the flow of the scenario while acting in the classroom, in order to be aware of what has been already done and what you have in front of you – what is to be done.
- ✓ Give students opportunities to access their peers' constructions, ideas, etc. You could achieve it, by using certain kinds of digital tools, like online forms.
- ✓ Consider that establishing peer evaluation/assessment culture among students will take some time. So, to make this procedure more efficient, try to introduce peer assessment from the beginning of your intervention.
- ✓ Try to follow the scenario's flow of activity, without being stuck on it. If something seems to work better bypassing a phase of the scenario, or following another trajectory, you should try to cope with it, and revise the scenario "on the fly".
- ✓ Encourage students to take responsible risks and try out possible solutions by being the first one to take risks. I.e. in educational robotics, you could be the first one to program a robot, without being sure about the success of your programming, and try it out, in order to establish this kind of culture in the classroom. At the same time, you should underpin the word "responsible" in risk-taking, by giving examples where risk-taking might be dangerous, damaging, even devastating.
- ✓ Arrange the flow of activity in the classroom, so that students will have the time to use their products as building units for other, new products, of their own preference. I.e. if they have made a lesson plan in order to teach the properties of a cube, they may

	choose to produce a series of similar lessons in order to teach the properties of all solids. ✓ You will probably confront students' hesitation, indecision, even disappointment when they face ambiguity. In fact, it is a chance for you to promote that they should be broadminded, accept vagueness as a characteristic of real problems and real-life situations, and facilitate them to move forward. You could achieve this by encouraging them to compromise with ambiguity, leave double-meaning situation as a loose end, and go to the next step, having in mind that they could turn back, later, being more informed of the situation, to deal with it. You could use a couple micro-scenarios[2], embedded in your intervention to stimulate tolerance of ambiguity; i.e. digital serious games of making decisions, etc.
✓ Intervene mostly to facilitate the interaction among students. Do not give them ready-made solution. ✓ While students work in groups, you should be aware of what it is discussed in the groups in order to take advantage of anything that happens. I.e. you might realize that two groups are following complementary approaches to address the same task. Then you should find the suitable time to stimulate communication between the two groups, without bias the way the two groups are supposed to integrate their perspectives. ✓ Keeping notes in-the-field could be useful, for reflection on your work. However, note-taking could hamper your facilitating role in the classroom. Using digital tools to capture critical incidents in the classroom could prevent you from such a burden. ✓ Be sure that you have given all students opportunities to participate equally to the communication, collaboration and interaction that take place in the classroom. Consider that some students might need an extra boost to feel inclusive, be engaged and involve in the classroom's activity.	✓ Make clear to the students what you expect them to make (a construction? a plan? a document?). ✓ Keep record of students' products versioning sequence; ask students to share draft versions of their constrictions, and provide them the tools to do it, by giving them access to a shared folder on the network. The different stages of each product, defines the trajectory of the product evolution and elaboration, which could be a useful feedback for students, and for you as well in order to document the learning that was occurred during your intervention. ✓ Gather data to document and evaluate the teaching/learning outcome of your intervention, and to reflect on it, later on. The kind of data needed, depend on the criteria that you have established/defined/constructed to evaluate the outcome.

Reflection (after the intervention and before the next one)	
✓ Evlauate your scenario, using the data gathered in-the-field; i.e. compare the implementation's duration to your prediction, and do the same thing with as much characteristics of the scenario you can. ✓ Compare students' constructions, products, and outcomes, with the ones that you have described in the scenario, before the implementation. If you point out significant differences, why do you think this	✓ Rethink about your potential of being flexible when you implemented the scenario; did the scenario leave you space for intuition? In what degree you felt autonomous? ✓ Were there any moments that you felt following the scenario "to the letter", whereas you thought that it was ineffective? ✓ Comparing students' constructions, productions and

[2] Scenarios with limited duration that are oriented towards a certain goal and could be part of a boarder one.

happened? Was it normal? ✓ Discuss on the feedback you got, with a colleague. Ask him/her to assess your scenario, in terms of the evidence taken from implementation. ✓ Go on with modification of the scenario, given that you think it is worth to do it.	outcomes. Which of them seems to be based on original and novel ideas? ✓ Which way you could foster most students to have original ideas (through the implementation of this scenario)? ✓ After the implementation, do you think that this scenario is still interesting for you? Is it beneficial for your students? Is it worth to elaborate and revise it?
✓ Were the resources you used appropriate? Did they make the scenario feasible? Were there any resources that were not used at all? Were there any resources used, whereas their use was not described in the scenario? ✓ Did the classroom environment worked as it was supposed to? The unforeseen incidents, if any, were significant for the success or failure of the scenario's implementation? ✓ In what degree did the communication work out? Was the peer-assessment culture established? Was the scenario inclusive for all students?	✓ If you think that your scenario is worth revising and elaboration, plan and then make the modifications that you think are necessary. ✓ If you are convinced that the modification needed are vast, then consider making a new scenario, which will be based in the idea of the implemented one. ✓ If you think that it should be better to make a totally new scenario do not start from scratch since you already have a valuable experience in designing and implementing a scenario; keep the feedback related with more generic aspects (like the time management of the intervention, the possible unpredictable obstacle that might come up) and reflect on it.

*** Generic guidelines that facilitate adopting a digital creative perspective in teaching/training daily practice**

✓ Publish your work, in order to get feedback from people that are interested in integrating digital creativity in their teaching. ✓ Collaborate with colleagues to design teaching/learning scenarios with the use of digital tools.	✓ Try to design scenarios not only oriented towards the disciplinary or subject of your expertise. I.e. if you are a science teacher, you should try to design a digital creative scenario that refers to a interdisciplinary theme based on science, economy, sociology and history, like "industrial revolution". ✓ Find scenarios of other teacher educators/teachers and try to modify them in order to fit your educational needs and practices.
✓ Keep yourself informed on the resources that available, usable and appropriate for your practice (i.e. digital educational environments, tools for formative assessment, or other tools that are not designed for educational use but can be used). ✓ Set up collaborations with other educational practitioners in and out of your institution in order to exchange ideas about designing scenarios. ✓ Participate in communities that exchange digital resources for teaching/learning. ✓ Take part in programs related with digital creativity in education that are organized on the basis of synergies between different institutions and stakeholders.	✓ Make new scenarios and keep record of your work. ✓ Do not leave your scenarios inactive. Try to renew them and implement them almost every year. ✓ Be aware of new, contemporary technologies and update your scenarios to be feasible and usable.