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a cura di
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Indice

Student teachers' pedagogical reasoning in TPCK-based design tasks. A multiple case study

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Teaching profession has to face rapidly changing demands with a sophisticated set of competences, which today more than ever include digital ones. Technology figures as active agent in shaping educational practices, but notwithstanding the now wide access to these tools, that did not translate in the hoped learning improvements, as extensively reported in literature. Pivotal seems understanding how educators give meaning to technology integration in their practices, i.e. investigate teachers' professional pedagogical reasoning. The paper reports on a wider research on the capability of initial teacher education (ITE) programmes to engage student-teachers' pedagogical reasoning (STPR) when performing technology-integrated design tasks. In the form of a multiple case study across Europe it included multiple instruments for data collection, here reporting on focused interviews (Ntot 36), participant observation and document analysis. Preliminary findings suggest an activation of STPR whose roots might find place outside the ITE influence, encouraging further research.

La professionalità docente deve far fronte a richieste in rapida evoluzione con un sofisticato insieme di competenze che oggi più che mai includono quelle digitali. La tecnologia figura come agente attivo nel plasmare le pratiche educative, ma nonostante l'ormai ampio accesso a queste, la letteratura riporta come non si sia realizzato l'auspicato miglioramento dell'apprendimento. Fondamentale è capire come gli educatori diano significato all'integrazione della tecnologia nelle loro pratiche, cioè indagare il ragionamento professionale docente. L'articolo riporta parte di una ricerca più ampia sulla capacità delle istituzioni di formazione iniziale (IFP) di coinvolgere il ragionamento progettuale dei futuri docenti (RP) in compiti di progettazione tecnologicamente integrata. Lo studio di casi multipli in tutta Europa ha incluso diversi strumenti per la raccolta di dati e qui si riportano interviste (Ntot 36), osservazione partecipante e analisi dei documenti. I risultati preliminari suggeriscono un'attivazione di RP le cui radici potrebbero trovare posto al di fuori dell'influenza delle IFP, incoraggiando ulteriori ricerche.

TPCK; Pedagogical Reasoning; Initial Teacher Education.

Theoretical background

Technology diffusion in educational practices seems now inevitable, but still struggles to produce the hoped learning results (e.g. [19]). Crucial seems to understand how teachers give meaning to technologies (e.g. the perceived pedagogical affordances – [2; 3; 28]) and which are teachers' motives and expectations, shaped by their professional knowledge (e.g. within the Technological Pedagogical Content Knowledge TPACK framework – [17]). Researchers suggest that teachers' technology integration practices lay strongly on their self-confidence and pedagogical beliefs, as well as on how they perceive technological affordances and professional knowledge [13; 16]. Heitink and colleagues [12], among others, remind us that the ways teachers cope with technology-enhanced educational practices depend specifically on how they professionally reason on the issue (see also [28]).

Although there is no theoretically unified model to understand teachers' reasoning for integrating technologies [18], the most accredited framework to this day goes back to 1987, with Shulman's Model for Pedagogical Reasoning and Action – MPR&A ([22]; see also [15]). He would mention several stages of such cognitive, dynamic process which a skilful practitioner should be able to discuss [22]. Recently, Shulman's MPR&A has been either supported and criticized, with the rising of revised models like Starkey's [24], declined specifically for the digital age, among others. Scholars like Harris and Phillips [11] examine the very relevance of Shulman's model when it comes to technology-enhanced instruction, suggesting a shift in content (now comprising technologies not yet available in Shulman's times) but not much in the reasoning processes.

Authors like Ranieri [20] and Calvani [5] highlighted the need to train teachers in identifying ICT's added value for the didactic transposition of content, rather than its simple use. Several researches have shown how acting on pre-service education can lead to long-term consequences for technology integration (see [1; 10; 25]), suggesting as one of the most effective, the practice of actively engaging student-teachers in design tasks. These would indeed provide opportunities to observe how technology, pedagogy, content and contextual factors (as for TPACK) mutually limit/reinforce each other [4; 9; 14]. On the other hand, there is not much research on how to offer TPACK-based design tasks explicitly supporting student-teachers' pedagogical reasoning for technology integration, in pre-service education.

Methods

This paper reports on a wider research addressing this gap and moving from the question: how can student-teachers' pedagogical reasoning be engaged by TPACK-informed instructional design tasks?

To answer the research question, a multiple case study research was set in place [23; 29], with three case studies identified in the European context for pre-service education, namely in Cyprus (EU 1), Italy (EU 2) and The Netherlands (EU 3). The researcher observed student-teachers enrolled in university level courses dealing with technology integration in education (Ntot= 345), for approximately 6 months in each site (academic years 2017-18/2018-19). Participants were 17-22 years old, attending their first university course dealing with the topic. During those university courses, as an already in-place-routine, they were required to complete two cycles of technology-integrated instructional design. The research included several instruments for data collection, implementing a triangulation strategy for data analysis [7; 29]. Participant observation and document analysis, carried out through the entire permanence in the field, provided background information on the academic organization of the three courses and enabled the researchers to access the language of the participants [8]. These helped informing focused interviews [6], aimed at investigating student-teachers' reasoning processes and carried out twice per context, at the end of each design cycle. Participants to the interviews were selected on a voluntary basis (Ntot= 36).

Collected data was analysed through ATLAS.TI for content analysis, and this paper outlines the results answering the research question, through documentation and interviews evidence.

Results

Analysing the three TPACK-informed design procedures implemented in the single case studies to identify any reference to pedagogical reasoning theoretical models like Shulman's [22] or its digitally-modified version [24], some interesting overlaps and overlooked dimensions appear (tab. 1). While it might appear as the contextual procedures ignore some reasoning dimension, it is to highlight that these findings pertain only to the instructions given to the student-teachers to perform their design task. Additional input, also related to the “missing” reasoning dimensions, could have been prompted during classes, but they were considered less accountable as attendance was not always 100%.

Table 1 – Reasoning dimensions explicitly mentioned in the contextual procedures.

Pedagogical Reasoning dimensions [22; 24]	**EU 1**	**EU 2**	**EU 3**
Comprehension of subject matter (core concepts and misrepresentations)	X	X	X
Transformation of the subject matter in teachable content: 1. Analysis of the contextual characteristics (adaptation)	X	X	X
2. Identification of context-sensitive goals	X	X	X
3. Selection of (technological) resources and teaching methods to engage previous knowledge	X	X	X
4. Create opportunities to build/share/critique new knowledge	X		X
5. Enable connections among groups and individuals to develop new knowledge			X
Teaching and learning practices: 1. Classroom-based acts, organization and management	X	X	X
2. Personalization strategies	X	X	X
3. Assessment practices			
4. Feedback practices			
Reflection (critic review and analysis of teachers’ decisions)			X
New comprehension (of teaching, learning and context)			

Furthermore, the three procedures were accompanied by different directions in the three contexts: EU 1 made them mandatory in each and every aspect; EU 2, while still making them mandatory, set different focuses for the first and the second design cycle (namely, on teaching approaches, first, and on technological affordances, later); and EU 3 used the procedures as mere suggested guidelines, letting student-teachers free to decide whether to use them.

Traces of reasoning in student-teachers' TPCK-informed design practices

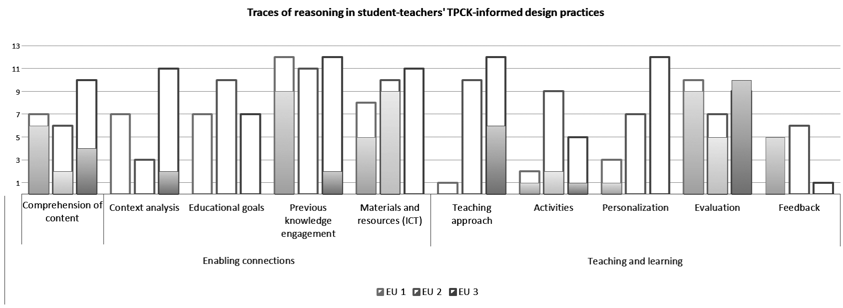

Figure 1 – Pedagogical reasoning dimensions reported by interviewees (empty columns), and their relation to the given design procedures (full columns).

Considering here the data from the second interviews (N= 12 per case) so to minimize the effects of unfamiliarity with the task and its procedure, a peculiar activation of pedagogical reasoning's dimensions can be seen (fig. 1). While student-teachers somehow report evidence of reasoning on most areas (empty columns), they struggle in relating those decisional processes to the requirements/use of the given procedures (full columns). It is to highlight that this figure only accounts for the instances of reasoning reported by the interviewees, and not for the reasoning's qualification. For example, some interviewees would mention that national curriculum's guidelines free them from the need to deeply comprehend the specific topic to teach (K., EU1); or that it might be pointless to speculate on technologies' affordances given the infrastructural inadequacy of the contextual school system (A., EU 2); or even that assessment practices might decrease teachers' likability, which is perceived as primary goal to the interviewee (J., EU 3). For further details on the results please see Trevisan [26].

Discussion and conclusions

This paper reported on a wider research addressing the issue of pre-service education for technology integration, through strategies of technology-integrated design tasks for student-teachers. The research question investigates how TPACK-informed design procedures, as offered in pre-service programmes, can engage student-teachers' pedagogical reasoning. The preliminary results here just outlined would suggest that some sort of pedagogical reasoning is indeed active during the implemented design tasks, but a) it does not seem highly linked to the procedures themselves, notwithstanding their explicit mention of some reasoning dimensions (tab. 1); and b) further insight might come from the analysis of the quality of reasoning, in terms of pedagogical orientation (e.g. teacher-/student-centred). Possible implications of this research for educational policies in ITE programmes would suggest to re-consider their impact on student-teachers' professionalization, to better ensure the qualification of skilful practitioners [22] with a sound reasoning and competence for technology integration.

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