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Exploring the Micro, Meso and Macro

Navigating between dimensions in the digital learning landscape

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Introduction

The demand for people with new, enhanced skills is growing. The volume of information produced and shared in all fields is overwhelming. Building the data economy became part of the EU Digital Single Market. Powerful and sophisticated ICT is part of everyday life, and the world of learning is not an exception. Pressure is on all players of the online education community to keep up with new learning solutions, and better supply the skills currently demanded by growing economies.

Open Education continues its success, providing radical advances in knowledge acquisition, sharing, distribution, and improving business models. Digital credentials and open badges are the new currencies which are beginning to transform the economic models in education.

Social and economic tensions continue to raise the issues of scalability, the micro-credentialling of education, training and skill development processes. Practitioners and stakeholders are eagerly seeking right approaches to providing learning opportunities, and many scholars are researching holistic answers.

Micro, meso and macro aspects provide an interesting range of lenses for considering the problem. These aspects may be applied in a general sense, distinguishing between the learning of individuals, learning at the institutional or group levels through a meso lens, and the learning of organizations or societies directed through policies through the macro lens.

Navigating these dimensions are the reshaping of digital pedagogy and online instructional design; the social elements including digital societal mechanisms and the position of the individual in our new era. We have need of systematic awareness and research in the critical era of sustainable socio-cultural aspects as they relate to learning.

Eoropean Union initiatives emphasize solutions to emerging needs and seek to improve competitiveness and professional development; enhance cross-sectional skills; and fuel the engines of social innovation – creativity, entrepreneurship, critical thinking and problem solving.

The EDEN 2018 Genova Conference aims to respond to contemporary needs by:

- tracking and demonstrating evidence about the mechanisms and value chains across micro-, meso- and macro-learning
- exploiting the socio-cultural specifics related to the granularity of learning
- digging deeper into finding viable, achievable and scalable solutions
- learning more about didactical design through peer learning and scholarly observation
- discussing structural and operational questions of collaborative - social technologies

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TEACHERS' DIGITAL CULTURE: THE HORIZON OF ITALIAN PARTICIPANTS IN A TFA COURSE

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Abstract

This paper focuses on the way Italian participants in a TFA course about Special Educational Needs shape their digital culture. The research was inspired to the Finnish Opeka project and was realized in November 2017 at the University of Foggia (IT). A 55 Likert-items questionnaire was administered by google module and several analyses were run through SPSS. Namely, a Principal Component Analysis was run by looking for four components structuring the participants' digital culture, according to literature. Then, the factors reliability and their correlation were calculated. Third, the differences among the four groups of participants composing the sample (Kindergarten, Primary school, Middle school, Secondary school) were analysed through MANOVA. Results show that the four factors differ from those proposed by literature, since they are shaped by a focus on rules and the support of the school community. All the factors have a high level of reliability and are correlated with one another, by characterizing a digital culture functioning as a system of reciprocally influencing components. Then, there are differences among groups especially on two factors, since participants get higher scores as the school levels go from the kindergarten to the secondary school.

Theoretical approach

European policies about education move toward the integration of Information and Communication Technology (ICT) in several life contexts. This approach is the result of the hard path that the knowledge society is doing (Messina & De Rossi, 2015) to integrate educational models in the contemporary society. That is, an enlargement of the educational contexts is needed, by integrating both formal and traditional educational institutions with no formal and informal ones. In such a panorama, the Bronfenbrenner's approach (1979) has a paramount importance. The ecological idea of macro, meso and microlevels characterizing the contexts where people live and develop should be taken into account, indeed, to understand the changes of boundaries, practices, relations, use of tools in learning contexts. This understanding can, in turn, support the further and integrate change of these components. In this process of change and positioning of contexts, the role of the teacher must be rethought and new teaching skills have to be developed. At the same time, indeed, they have to restructure and manage new relations among the educational contexts (such as school, family, informal learning environments, etc.) pupils handle with and have to teach the skills required by the contemporary world (e.g. digital skills, key competences, specific abilities, etc.). In this ongoing

movement from tradition to innovation, there is, therefore, a re-definition of the students' identity, the teacher-student relationship, the learning activities, the tools mediating learning, etc. Many research questions can arise from the observation of these processes; however, in this proposal we ask how teachers' digital culture is composed and look at the possible dimensions composing it. Viteli, Sairanen, and Vuorinen (2013), elaborated a four-factors schema to describe how both teachers' and schools' digital culture is shaped. More specifically, authors suggest that the following four dimensions characterize such a culture: (a) Leadership and Management; (b) Resources and Access to resources; (c) Confidence and Competence; (d) Motivation and Time. "Leadership and Management" dimension refers to the way teachers arrange the digital tools for teaching, their perception of the cooperative relations with colleagues and technical experts, the pedagogical support they think to receive by expert colleagues. The factor "Resources and access to resources" involves the idea of having insufficient resources, technical problems and technical support at school. The factor "Confidence and competence" refers to the skill and experience teachers have about the use of digital devices in the teaching activities. Instead "Time and Motivation" factor mainly involves the motivational dimension which supports the teachers' use of ICT in education.

Aims

The aims of this paper are:

- To analyse which factors are associated with the digital culture at school in Italian participants in a TFA course for burgeoning teachers of students with special educational needs;
- To analyse if and how those factors differentiate in relation to participants' level of schools they already teach or are specializing for (Kindergarten, Primary school, Middle school and Secondary school).

Context and participants

This research was inspired by Opeka (Viteli, Sairanen, & Vuorinen, 2013), which is a Finnish project lead by the University of Tampere (FI). It was aimed at grasping the digital culture of schools by answering a self-report questionnaire exploring the dimensions shaping the teachers' perception of ICT at school. During Opeka project (since 2004 and still ongoing), more than 3000 Finnish teachers were involved. Through several statistical analysis, it emerged that four different factors shape the teachers' digital culture, which are "Leadership and Management", "Resources and access to resources", "Confidence and Competence", and "Time and Motivation" (already described in paragraph "Theoretical framework"). In October 2017, the administration of the questionnaire was repeated in Apulia, a Southern Italy region. 149 teachers participating in a TFA (Tirocinio Formativo Attivo, Active Formative Training) course where involved. In Italy, TFA is one of the learning paths teachers can attend to get the license as teachers. Namely, if you want to teach in the kindergarten or in the primary school, you need to take a five-years master degree in Education. If you want to teach in the middle or in the secondary school, you need to take a master degree on a specific topic (e.g. Math, Literature, Biology, and so on) plus the TFA specialization. However, if you want to teach student with

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special educational needs, you need to attend a TFA course devoted to this issue whatever level of school you are going to work in (even if you want to teach in the kindergarten or the primary school). Therefore, since we involved participants in a TFA about special educational needs, the sample is composed by four groups of teachers. Graph 1 shows the percentage distribution of the groups in the sample.

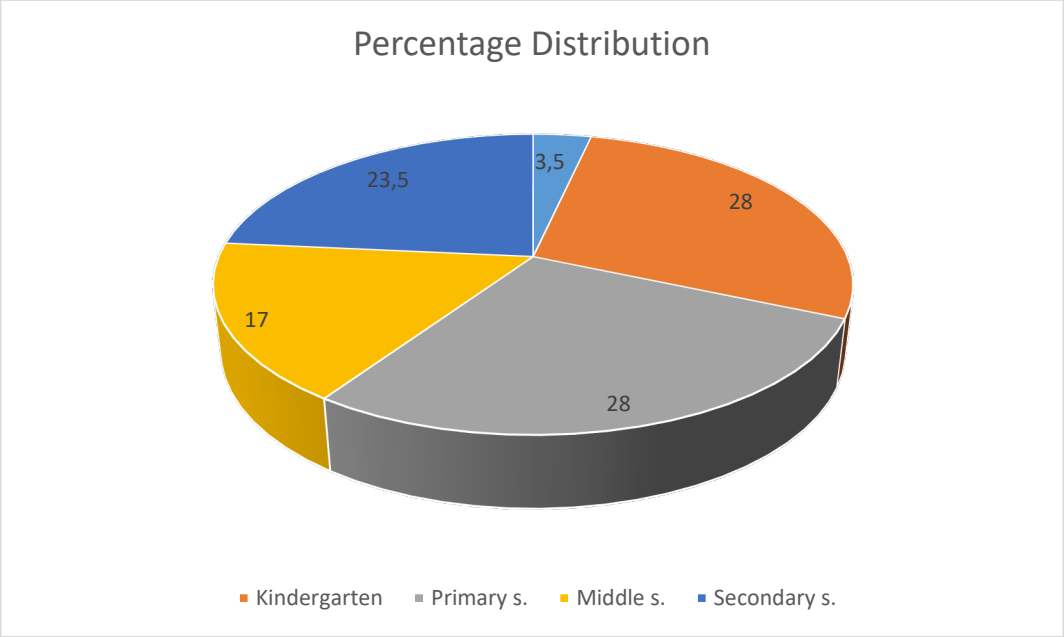

Figure 1. Percentage distribution of teachers in the four groups (Kindergarten, primary school, middle school and secondary school)

Data collection

The original Finnish questionnaire was translated to Italian by two researchers who first made a literal translation. Then, a broader team of researchers (composed by four experts) checked the translation and rearranged the questionnaire by taking into account the Italian cultural aspects about the digital thinking of teachers and the idiomatic expressions in the items. During a third step, 10 teachers were involved to complete the questionnaire and indicate eventual unintelligible aspects. As a further step of the questionnaire's preparation, the team arranged the final questions according to the teachers' suggestions. The definitive tool was a 60-items self-report questionnaire (5 demographic questions and 55 questions about the perception teachers have about the use of ICT in education). Each of the 55 items was structured as a five-points Likert scale (0=completely disagree, 5=completely agree) and the questionnaire was administered during the first week of the course by an online google module.

Data analysis methods

After collecting data, we used the following methods of analysis:

- Explorative factorial analysis through Principal Components Analysis (PCA);
- The calculation of the reliability of the factors emerged through the factorial analysis;
- The calculation of the correlation of the factors emerged through the factorial analysis;

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- The creation of four sum variables corresponding to the reliable factors;
- The MANOVA test to detect differences among the four teachers' groups on the four factors.

All of the analysis was made through SPPS software.

Results

PCA was conducted on the 55 items with orthogonal rotation varimax. According to literature, PCA was run by looking for four factors. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO=,813 ("great" according to Field, 2009) and all KMO values for individual items were above the acceptable limit of .5 (Filed, 2009). Bartlett's test of sphericity χ^2 (1653) =5,927, p<,001 showed that all the correlations between items were sufficiently large for PCA. By analysing the items composing each factor, we defined the components as follows. Component 1 represents the "Use of ICT and teaching", since it implies items exploring the reasons why teachers could use digital tools during their job week or their students should use them (e.g., to build collaborative knowledge, for interdisciplinary learning activities, to interpret information, and so on). Component 2 represents "Innovative teaching and evaluation", which implies items grasping if and how teachers can use new technology for innovative learning and assessment activities (e.g. I use e-portfolios to evaluate students, I use learning analytics to assess the students' activities, I use virtual reality activities, and so on). Component 3 represents "Rules and digital skills", which involves those items analysing how teachers perceive the rules related to the use of technology (e.g., When I use a new digital tool I always read the terms of use and conditions, I guide students to protect themselves from the common risks related to the use of new technology, I know how to use digital materials for teaching, etc.). Component 4 represents "Educational community", which implies items exploring the technical support in the use of digital tools by colleagues and specialists (e.g. I receive technical support for the digital tools at school). Furthermore, it is saturated by items analysing the relational dimension of the school community and the eventual support it gives to the teachers (e.g. We share suggestions and support each other about the use of new technology for education).

After running the PCA, we checked the correlation among the four factors through Persons' r. Results show that Component 1 has a significant positive relationship with Component 2, r=.61, p (one-tailed) <.01; Component 3, r=.72, p (one-tailed) <.01; Component 4, r=.31, p (one-tailed) <.01. Component 3 has a positive significant relationship with Component 2, r=.74, p (one-tailed) <.01 and Component 4, r=.36, p (one-tailed) <.01. Component 4 has a positive significant relationship with Component 2, r=.36, p (one-tailed) <.01 as well.

We also run MANOVA test to detect differences among the four Italian school levels (Kindergarten, Primary school, Middle school and Secondary school). It emerged that there is a significant difference between teachers belonging to the several levels of school when considered jointly on the Component 1 "Use of ICT and teaching" and the Component 2 "Innovative teaching and evaluation", Wilk's Λ=.673, F(16, 431)=3.7, p=.000, partial η=.997. A separate ANOVA was conducted for each dependent variable, with each ANOVA evaluated at

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an alpha level of .025. There was a significant difference among the teachers' groups on Factor 1, F(4, 144)=11.85, p=.000, partial η2=.248 with secondary school (M=52.08) scoring higher than middle school (M=46,92), primary school (M=42,71) and kindergarten (M=35.42). There was a significant difference among the teachers' groups on Factor 2, F (4,144)=3.299, p=.013, partial η2=.084 with secondary school teachers (M=48.229) scoring higher than middle school (M=40.28), primary school (39.286) and kindergarten (M=38.048). For Component 3 "Rules and digital skills" the assumption of Levene's test >.05 was not met. For Component 4 "Educational Community" p>.025.

Conclusions

Several conclusions arise from this research. The first point is about the kind of components shaping the Italian teachers' digital culture. We find of interest the eventual difference of the factors when compared with the dimensions composing the Finnish digital culture. Indeed, it seems that the Italian ones are more rules-related (in terms of technical indications to be followed when using a new digital device and the rules to preserve students by eventual risks). Furthermore, the community of the school teachers refer to seems to be more stressed in the Italian factors. This is understood as the ensemble of both relational aspects of the community (e.g. the supporting relations among colleagues, the sharing of tools and so on) and technical support by the community itself. The last but not the least, "Leadership and Management" and "Time and Motivation" aspects appear less highlighted in the Italian sample. This interpretation of the overall results emerged through PCA can suggest that the Italian participants are less confident with the use of technology at school, since they need to look for the technical rules and the colleagues' or experts' support. At the same time, however, they perceive the community as a resource for handling with digital teaching tools and activities.

Of course, a strong comparison between the Finnish and the Italian participants cannot be realized, since the two samples are not standardized and the questionnaire is not yet validated. Furthermore, our interpretation of the results can be biased by the knowledge of the local context. However, we do think that the teachers' digital culture belonging to both contexts is very much culturally mediated. In fact, it is connected to both individual (each teacher) and school (the single school eventually the teacher works at) microlevel. In integration to this, it is related to the mesolevel of the system of schools from the Southern Italy area (or the Finnish one) where the research was realized. In turn, it is connected to the macrolevel of the policies, values, meanings a single country or the Europe have about digital processes at school.

We de claim that these aspects are in some ways suggested by the results and that can be furtherly explored through future studies.

The second point we find interesting is the correlation among all the factors, which means that the digital culture of teachers can be understood as a system of integrated and reciprocally influencing components. The third and final point we want to highlight is about the differences that we found among groups, significant for Component 1 (Use of ICT and teaching) and Component 2 (Innovative teaching and evaluation). On each of these factors, higher school's

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teachers have scoring higher than the middle school's one. These last have higher scoring than the teachers from the primary school and these last have higher scores than the teachers belonging to the kindergarten group. It seems, therefore, that the teachers' scores on these two dimensions get higher and higher as you go ahead with the school levels (indeed, the teachers from the kindergarten have the lowest scores at all). This result can be culturally mediated as well, since in the lower levels of school, in Italy, teachers are supposed to use more and more the digital devices for teaching since the creation of relatively recent polices. The middle and the secondary schools' educational system, instead, is required to use them since longer.

At the end, we can say that these results can be understood just with a micro-meso-macro view and that, in turn, can give a stronger understanding of the way the entire educational system is nowadays changing.

Further analysis can be realized to in depth grasp the phenomena. However, we think that this research can already suggest some implications in terms of arrangement of the TFA course analysed. For example, participants can be supported in metacognition processes to gain awareness about the meaning they build on the several digital culture dimensions, the way they position themselves in respect to the components, the feelings they have about the group they belong to, and so on. Furthermore, learning activities mixing the groups of participants (kindergarten, primary, middle and secondary) can be realized in order to stimulate a migration of competencies across groups and to realize vertical digital mediated learning activities for students.

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