Exploratory Investigation about the Use of ICT in the School. From Latent Dimension Analysis to Clusters

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Exploratory Investigation about the Use of ICT in the School. From Latent Dimension Analysis to Clusters

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Abstract: This paper illustrates the outcomes of an exploratory research on the motivations, needs and expectations of teachers in relation to the use of new information and communication technologies in teaching and their development and accompaniment needs. The initial hypothesis is that the personal teachers' beliefs and motivations with respect to the uses and usefulness of digital resources and tools in classrooms are decisive in relation to the type of didactic practices that pass through the "hidden" curriculum in the intangible dimensions of the educational process and context. Through the analysis of the results of a quantitative research conducted through an online survey, the essay illustrates the tensions that accompany the difficult transition.

Keywords: teachers digital skills, social research, education system, communication

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Introduction

The evolution of digital technologies produced extraordinary changes in all social activities, modifying, market system, working, teaching, relationship and any other dimension of our life. For these reasons an increasing number of researches, in last years, faced the question focused, more and more, about the influence of digital evolution on education and people. Only for example we can remember Helsper & Enyon (2009) and Presky (2013) contributions regarding digital native; the OECD proposal (2010) related to a systemic approach to technology based school innovation; the organization of space-time in digital collaborative learning (Ritella, 2018), and so on. The contribution we want to make by this research consists of a systematic representation of digital uses and needs in Italian schools, why national registry cannot inform us about daily practices in the use of digital recourses in education system. The descriptive-interpretative pilot survey (Bailey, 1978), by means of a structured questionnaire presented here, sought to fill this void by verifying the practices, expectations and perceptions of teachers in relation to their digital use in educational processes. The research methodology aims to integrate qualitative and quantitative approaches in view of the different information skills and usefulness and the necessary integration of techniques, tools and approaches inspired by different interpretative paradigms. The study is part of a research path that began in 2012 with a multidimensional approach based on a secondary analysis of document data (Capogna, 2014); a qualitative research aimed at understanding the experiences and practices of digital teachers and the quantitative exploratory research which is the subject of this essay. For this purpose the essay is articulated as follows: the drawing of the research, the empirical investigation; a look at the data. Final considerations conclude the work.

The research design

The results emerged by in-depth interviews carried out in the first phase of research show three main issues. First of all "ICT determine different kinds of interaction, transforming the education activity by the knowledge paradigm to the discover paradigm, where the teacher becomes a motivator" who learns and innovates with her/his students. Secondly, technological devices modify the *institutional space*, introducing a conflict for commanding both the symbolic power (Bourdieu, 1988) of knowledge and the innovation fate of the school. At last, the teacher's superior role, based on the power of knowledge, has been broken; "other factors come into play such as the control of technological devices, the flexibility, the hybridization solutions, the integration of perspectives etc. All questions require to teachers new and

innovative competences such as in social-emotional, communicative and methodological skills requested to move in the socio-technological environment for learning. On the basis of this research results (Capogna, 2016), we have created an online pilot survey to investigate more closely the teachers' experience. The questionnaire aims to focus this dimensions of analysis. It is organized around six thematic nucleus with questions aimed at detecting socio-personal profiles, behaviours, attitudes and beliefs.

The sections of the questionnaire are the followings: schools details; teacher profile; use of technology equipment; self-evaluation of digital competences through the DigComp Framework (2016); motivations and professional needs; personal opinions regarding the use of ICTs and finally the section on "developing-accomplishing needs" of teachers in the daily practice of ICTs into teaching and organizational processes.

The quantitative survey involved 1210 teachers (2,98% of the teachers that we emailed) that who participated on voluntary basis in the questionnaire by linking directly to the public access area provided for the survey. We considered only the questionnaires filled until the 31.03.2016, referred to as the deadline for participating in the survey. This exploratory analysis is therefore considered to be an e-research because it has been transmitted and carried out through the Internet with all the advantages and disadvantages it incurs (Ricolfi, 1996; MacElroy, 2000; Bryman & Bell, 2015; Vaske, 2011). A non-probabilistic sampling was then performed, where some units of the population were not able to be selected (for self-exclusion with respect to network use).

We have opted for a 'reasoned choice' sampling as privileged subjects and research channels considered to be characteristic of the phenomenon investigated: the diffusion of digital skills and practices in educational processes/systems and the positive propensity to use of the network.

And although the reasoned sampling "doesn't offer the guarantees that offers the probabilistic sample, nor the advantages of the simplicity in executing the sample sampling" (Corbetta, 1999, p. 350); in the specific case analysed, it was convenient to reach the schools with particular propensity to innovation and to intercept those teachers sensitive to the proposed survey themes.

Despite the sampling limits, compared to the total teaching population of 720.590 (MIUR 2014), the number of respondents was 1210, with 95% confidence level and 3% error margin.

Consequently, the results of research, although not statistically representative, constitute a useful pilot detection, and provide a rich exploratory basis on an extended population with the intent to test a survey tool that could be used in the future for a National Observatory on these issues or for more targeted research.

The empirical survey: validation of the analysis tool and factorial analysis

From a statistical point of view, validating an analysis tool (in this case a questionnaire) means verifying if the tool is appropriate to measure the actual aspects of the research. In sociological applied researches, the common method for validating the tool is by using SEM (Structural Equations Models) (Bollen, 1959). The determination of the goodness of the confirmatory and complete factorial model is based on various statistics whose threshold values are discussed in literature (Muthén & Muthén, 2010; Marsh, Balla & Hau, 1996; Bentler, 1990; Marsh & Hovecar, 1985):

- Chi-square: p-value greater than 0.05;
- RMSEA (Root Mean Square Error of Approximation): less than 0.05:
- (values between 0.05 and 0.08 indicate a reasonable fit capacity of the model; between 0.08 and 0.1 mediocre; values greater than 0.1 indicate a weak adaptation of the model);
- CFI (Comparative Fit Index): greater than 0.90;
- TLI (Tucker-Lewis Index): greater than 0.90;
- SRMR (Standardized Root Mean Square Residual): less than 0.08.

The validated tool is a very large questionnaire consisting of seven sections for a total of 63 questions, structured as a battery of items. Each question has been tested in terms of internal coherence through Chronbach alpha (Chronbach, 1951)[1]. It is important to notice that each question has been formulated according a theoretical hypothesis checked by a exploratory factor analysis and validated by a statistical model. The reference sampling number is 1210.

A look at the data: from latent to cluster dimensions

In order to deepen the analysis, offering a more effective synthesis perspective, the aspects of the questionnaire analytically described were subjected to an exploratory analysis. The analysis was functional to highlight the underlying conceptual dimensions, in order to read the integration of ICT in education through synthetic descriptors.

The extracted factors and their components were then classified using cluster analysis, dividing the sample complete cases (1028 cases) in specific groups. The following paragraphs describe the most relevant aspects that emerged from the factor analysis.
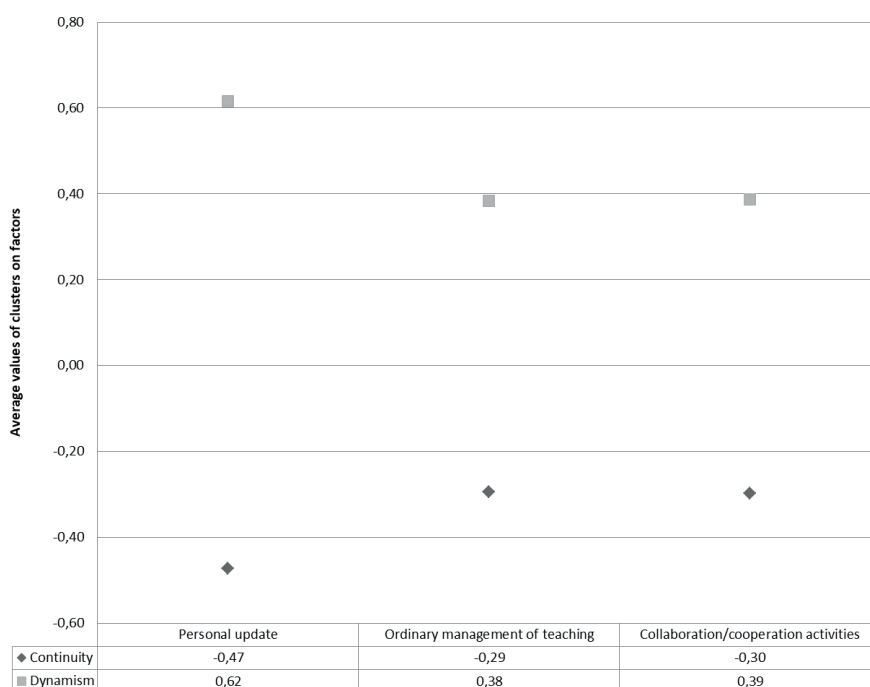
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[1] Nunnally & Bernstein (1994) suggest that values between 0.8 and 0.9 are considered satisfying and the item group do not need to be revised; values smaller than 0.8 suggest that items are incomplete and need to be augmented; values greater 0.9 suggest that items are redundant and need to be pruned.

Double speed innovation

The first aspect: "Changing approach to ICT in education" is the result of three latent conceptual dimensions: the willingness to change the use of ICT in their personal training; the inclination to change the use of ICT within normal operations and, finally, the willingness to change the use of ICT in collaboration and exchange activities with colleagues and students.

From a graphical point of view, in the negative pole of these three latent dimensions, there is a group of teachers resistant to change while, in the opposite pole, teachers are willing to change.

Chart 1. Double speed innovation.

	Personal update	Ordinary management of teaching	Collaboration/cooperation activities
◆ Continuity	-0,47	-0,29	-0,30
▪ Dynamism	0,62	0,38	0,39

The groups related *to the change of ICT approach in education* are therefore two and have been interpreted through the continuity and dynamism label to highlight some changes that have occurred over the last three years with regard to the use of digital resources by teachers. In the cluster indicating the continuity flows 56.5% of teachers; while in the cluster characterized by dynamic converges 43.5% of teachers.

In the last three years teachers of the childhood school expressed greater continuity with regard to the use of digital resources in the teaching process (71.2%). This can be considered coherent with an educational approach

typical of this school population, aimed at encouraging the experiential, manipulative and game playing dimensions, aimed at motor and cognitive development in early childhood. For this reason, teachers in childhood schools have emerged from lower values in the analysis of factors related to the change of approach to staff upgrading and to the use of ICT in ordinary teaching and collaborative activities with colleagues.

If we look at the teachers' age in relation to the clusters about changing approaches to ICTs, the younger (up to 30 years) and older (over 60) are those who are less orientated to change their attitudes in relation to the use of ICT in the teaching-learning practices.

This data can be linked to the native digital cohorts, for the younger teachers that already use innovative practices and daily ICTs in and out of the classroom, as well as to their career instability which leaves them a little bit at the margins of the school change processes. For the older teachers, the data can detect for them a general tendency not to abandon the comfort zone, determined by the guarantee offered through established professional routines. Analysing the cluster in relation to the tasks, we can note that employees with interim function (62.7%), and those who carry out teaching/ support of colleagues on the ICT side (63.7%) are more inclined to change. Teachers, who have not significantly changed their digital use approach over the last three years, are those without assignments (63.5%), school precarious (67.9%) and 49% over 40 (years of age).
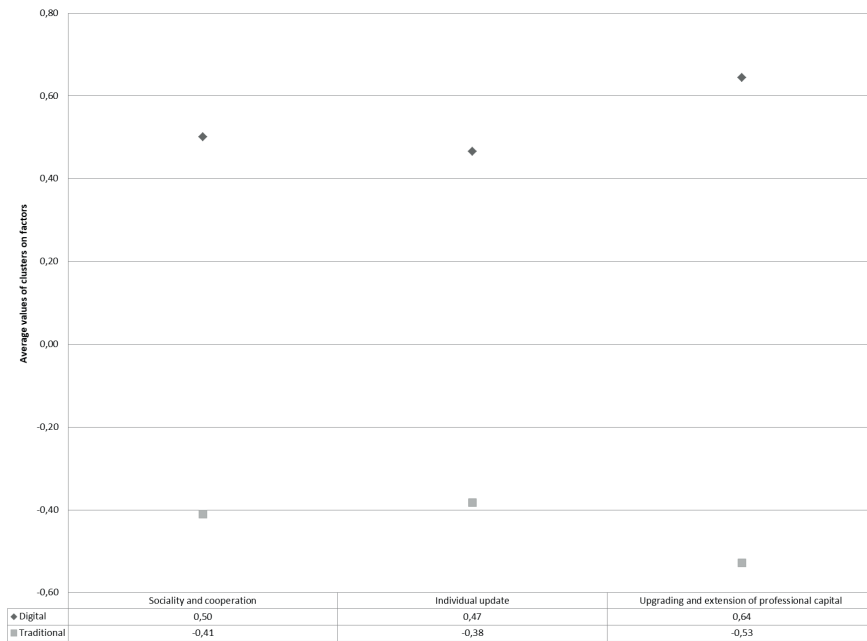
The professional development of teachers between tradition and innovation

The second aspect "Digital resources in the professional development of teachers" is the result of three latent conceptual dimensions: the tendency of teachers to sociality; the inclination to update individual teaching through ICT and, finally, the use of ICT in upgrading and extension of professional capital.

The pole that contributes to defining a traditional professional development is formed by teachers who do not make much use of digital technologies as lower values in all dimensions described show. At the opposite pole, on the axle shaft of the high level of ICT use, and in particular of the network, the same components are placed in their highest values. Groups related to "Digital resources in the professional development of teachers" are two and based on different models of professional development. Altogether, we have identified: *Digital* and *Traditional*. Teachers who embrace the Digital Model are 45% of the total, unlike 55% of those who claim to be linked to a traditional type of professional training/ development model, where the use of the network is less effective. School orders do not particularly affect the

distribution of clusters. The inclination to individual use of digital resources for professional development exceeds the social trend of using ICT for training and upgrading only by a few points of percentage.

Chart 2. The professional development of teachers
between tradition and innovation.

	Sociality and cooperation	Individual update	Upgrading and extension of professional capital
◆ Digital	0,50	0,47	0,64
■ Traditional	-0,41	-0,38	-0,53

   Younger and older teachers are the least represented in the cluster that identifies a participatory/ innovative model to professional development, with 32% and 30.8% of teachers in the age groups of respectively under 30 and over 60. The first ones probably hampered by insecurity and unclear future while the others, from the perspective of teaching output and physiological problems, in accepting the change, due in part to their age and in part to their experience.
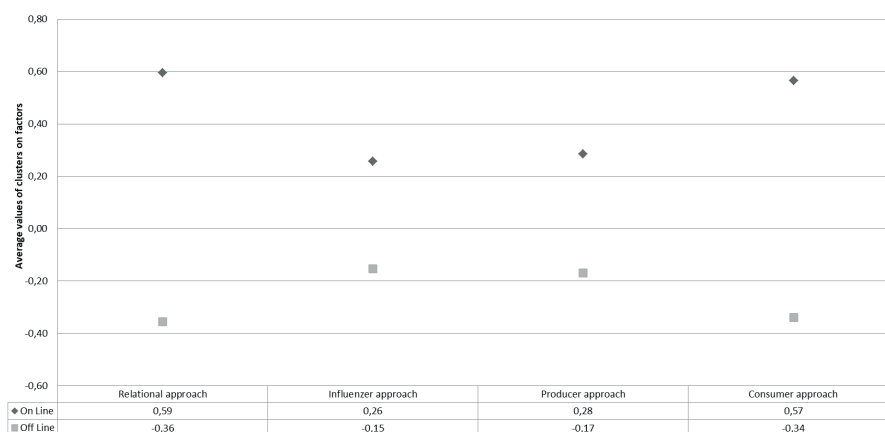
   Relatively to professional development predominates a participatory/ innovative model that combines individual self-refreshment, co-operation with colleagues and the extension of their shareholder capital, in those assistant professors with a vicariate function (66.1%), in figures instrumental (62.2%) and in 82.1% of those who devote themselves to training and supporting colleagues. Once again, the absence of a digital professional development model prevails for those teachers who do not have responsibilities in school (70.2%) and for those who are school precarious (63.5%).

Teachers and the Network: from the Online Model to the Offline Model

The third aspect "teachers and the network" is the product of four latent conceptual dimensions: the relational use of the network, the active participation in building and sharing knowledge through the web, where we can place group of innovative teachers (influencers) who tend to draw on digital innovation; the active participation in building information and relationship spaces (producer), where a communicative approach seems to prevail, attentive to the information and reporting potential offered by the network; the use of information for research and network upgrades that can be interpreted as an instrumental approach, in which the network is experienced as consumer space (consumer).

Chart 3. Teachers and the network.

	Relational approach	Influenzer approach	Producer approach	Consumer approach
◆ On Line	0,59	0,26	0,28	0,57
■ Off Line	-0,36	-0,15	-0,17	-0,34

The groups related to this third aspect are two and describe the approach of teachers to browsing the web. The first group collects lecturers who express an innovative vision (37.4%) on network browsing with high values on all latent factors identified. This first group is called online. The second cluster brings together teachers who have a traditional view of the web, recording low values on all dimensions (62.6%). These are defined as *offline*. In different school orders, the distribution of teachers on the two clusters confirms the general data with some differences. The secondary school teachers of first and second degree are confirmed *off-line* with respect to the use of the network for a few percentage points higher than the general subdivision, with respectively 63.5% and 65.7%. Compared to the age group of teachers, those who are from 31 to 40 years old increase the proportion of online teachers (43.3%). By contrast, the ultra-60s are still the most dejected in the innovative use of the web with 69.2% of the teaching staff identified as offline. Teachers with a vic-

arage role and those who work in training and supporting colleagues on ICT are largely enrolled in the online teaching group, with 63.6% and 56.8%. Once again, the lack of specific assignments and the precarious state in the school curb the propensity to teachers' innovation. In fact, those who fall into these two types come in a higher percentage in the offline cluster of less proud content production and collaboration within digital environments, with respectively 70.5% and 66.4%. It should be emphasized that 62.9% of support teachers do not use the network at all, a fact that we can always read about the school of affiliation: 43.6% of those who teach in support are teachers of primary school (38.5%) and childhood (5.1%). School orders less endowed with infrastructure and more oriented to the use of experiential, expressive and manipulative teaching methodologies useful to promote the integral development of child and his path towards autonomy.

Analogical and digital teachers

The last aspect analysed: "Using ICT in the classroom", describes the frequency of use of digital technologies in teaching and is the product of the nine-dimensional conceptual latitude dimension: the use of the Office Package; the use of software to download audio/video files; the use of browsers for Internet surfing; the use of resources for the creation of audio, video and graphic contents; the use of resources for the creation of blogs, sites, and hypertexts; the use of software for gamification; the use of environments and resources for education; the use of digital educational content; and, finally, the use of digital resources for synchronous and asynchronous communication. The groups identified for this aspect are two: the cluster *Analogical* (60.9%), which includes those teachers that record low values on all latent factors described above; while the *Digital Clusters* (39.1%) collect teachers who are characterized by high values on all factors considered.
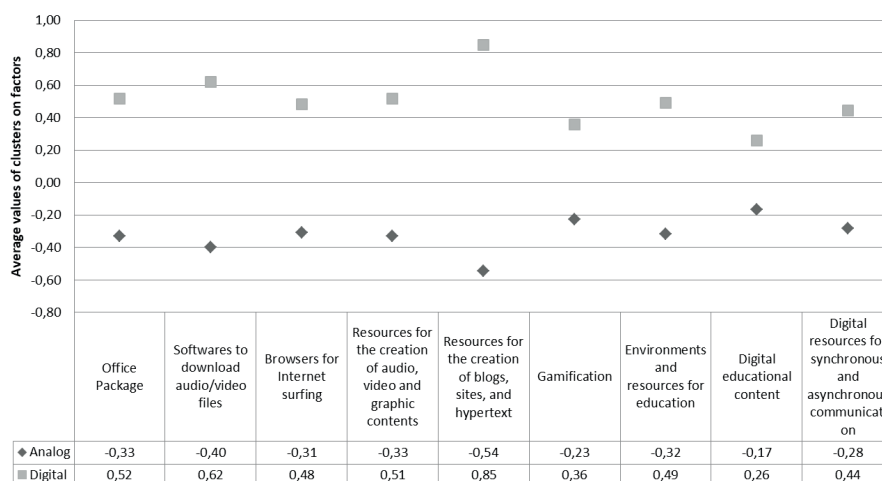
From the percentages reported, there is a clear predominance of the first group of teachers, the *Analogical* because of their poor use of digital instruments in the classroom. The data has shown, among its main reasons, the budget and infrastructure deficit of many institutions (lack and obsolescence of technologies, absence of multimedia classrooms, network problems, financial problems, lack or poor distribution of resources, lack of technical assistance and training). Among the teachers who encounter frequent problems with the dotational dimension, a large percentage belongs to the *Analogical* group (often 62.3%, always 62.4%). These are also those who, in a higher percentage, have problems with the institutional design dimension, which includes, among the various dimensions, the inadequacy of specific training and the lack of legal/institutional recognition of the activity (often 65.5 %, always 69.8%). Digital teachers are more sensitive to the problems

of organizational inertia in the specific dimensions of colleagues' resistance and their lack of collaboration in the process of teaching innovation (often 59.6%, always 90.5%).

In primary and secondary schools, there is a clear predominance of the *Analogical* clusters, respectively with 74% and 62.4% of the teachers.

In the distribution of clusters within the age group, there are no big differences in the distribution of the two clusters across the sample, except for teachers over the age of 60 who are in net dominance in the cluster Analogical with 73.6%; while those who belong to the age range from 51 to 60 years have reported a few percentage points in favor of the Digital Clusters (42.9%).

Chart 4. Analogical and digital teachers.

	Office Package	Softwares to download audio/video files	Browsers for Internet surfing	Resources for the creation of audio, video and graphic contents	Resources for the creation of blogs, sites, and hypertext	Gamification	Environments and resources for education	Digital educational content	Digital resources for synchronous and asynchronous communication
◆ Analog	-0,33	-0,40	-0,31	-0,33	-0,54	-0,23	-0,32	-0,17	-0,28
▪ Digital	0,52	0,62	0,48	0,51	0,85	0,36	0,49	0,26	0,44

The figure confirms that the young age is not synonymous with an innovative teacher, suggesting greater propensity to innovation in those teachers who have matured for more years of service and therefore have a greater educational experience and consequently a more prominent competence in governing processes. Moreover, innovation can only be produced with respect to what is known in depth and comprehensively. Compared to gender, male teachers are distributed in almost two and half clusters (Digital: 48.6%, Analogical: 51.4%); while female teachers confirm their concentration in clusters of analogical teachers (Digital: 37%, Analogical: 63%). The male professors, on the other hand, represent 38.9% of teachers of technical-professional subjects, disciplines that collect a high percentage of Digital Teachers (57.6%), compared to the distribution of clusters across the sample, which we remember is 60.9% for the so-called Analogical Teachers and 39.1% of Digital

Teachers. It can be assumed that the greater propensity of teachers to use ICT in the classroom is related to the disciplines taught.

Once again, associate professors with vicarage and those involved in training/support activities for colleagues on the ICT side belong to the Digital group, with respectively 67.9% and 73.2%, confirming their fundamental role of innovation activists for all actors involved: from students, colleagues, staff figures and families.

In summary, the prevalence of the observed practices appears to be largely consistent with the framework of emerging beliefs and profiles, and clearly call for the need for training-up-to-date intervention. This must be able to overcome the episodic and experimental perspective to move towards a model school that cannot ignore the pervasiveness of digital technology, whose influence goes far beyond the sphere of access to knowledge, invading priority space of self and intersubjective relationship.

Conclusions

As final step of the work, we will focus on the central issues that have guided the research in an effort to provide a picture of the most significant elements emerging in Italian system. The Centre for Educational Research and Innovation offers an interesting contribution around a systemic approach to technology-based school innovations, highlighting, among other things, "the lack of research evidence and gaps in the feedback loop of the evaluation process in conjunction with the push for greater accountability and increased assessment of the system, teachers and students" (OECD, 2010, p. 147). But the main issue is the idea (with which we totally agree) "whole discussion about technology in education has to be redefined in the light of what we all should be caring about: the quality of students' learning" (ibidem, 2010, p. 12).

Also if the research results of this pilot survey cannot be consider in statistical and evaluative way, they can provide interesting suggestion for a better comprehension of the Italian context.

First of all, examining the way in which day-to-day practice relates to the technology provided at schools, we observe a considerable difficulty in interpreting and integrating the affordances offered by digital technologies in the educational context. The epistemic function of expanding knowledge and discover the world and other forms of relationship by digital technologies appears weak, involving a residual share of innovative teachers. A pragmatic approach prevails directing the use of digital technologies in an instrumental and practical manner with respect to the object of knowledge, differently represented by educational content or other subjects with which it may be related. There is no sufficient understanding about the way by which digital

technologies influence the construction process of subjectivity and identity through the new forms of dialogue activated by digital technologies. In fact, digital technologies create new social processes and opportunities for people, a new reality which acquires sense by the system of intersubjective relationship in which we are all immersed thanks to the Internet.. A dialogue that always pertains to people in a totalizing way, embracing "not just reason, but also feelings, body, desire, emotions, individual faculties" (Gilbert, 1994, p. 25).

With regard to the way in which personal approach to digital technologies takes place in professional practice and in daily teaching, although there is a certain mental opening, confirmed by a system of basic assumptions and emotional sphere which is quite positive in relation to the utility of digital technologies in didactics, there is no automatic transfer of practical knowledge acquired in extracurricular experience. It is noted, however, the importance of the professional community in orienting and supporting those tertiary socialization pathways within which new prospects of action and new areas of expertise can be improved. The prevalence of individual experience through which professional practice is represented and the digital competence development paths show the strength and persistence of an analogical sociality and community perspective. A situation in which the digital is an alternative, though valid in many respects, that is difficult to incorporate into relationship and building processes of a renewed professionalism. With difficulties a reflective perspective emerges; a perspective able to reconsider primary missions of schools, the promotion and development of uniqueness that characterizes every single person, accompanying the growth and enhancement of the reference communities. This change can be explained through a continuum that goes from the primacy of the content, summarized, by the role of the *teacher as knowledge medium*, followed by the adaptation of *technological as medium,* used in transmitting key, up to the last stage of this evolution, i.e. the primacy of reflexivity, guaranteed by a *dialogic and recursive relationship* between people (teachers-students) involved within and out the web. In this perspective the paradigmatic change involve methodologies and didactical approaches. We assist to some important revolutions: the redefinition in the way in which knowledge is built, shared and managed within and out the educational community (with peers, superiors, learners, family, etc.); the mutation of teachers' role boundaries that can legitimize their actions; and the modification of teachers' autonomy spaces through which teachers can act their teaching agency. Indeed, this is the inevitable premise needed to promote new methodologies and teaching approaches.

In the transition from one stage to the next, various organizational configurations emerge (Boccacin & Rossi, 2011) with the need to master differ-

ent and new areas of expertise, from the empathic one which allows subjects to use their own creativity, guided by ethics of responsibility.

With reference to the most widespread experience and skills available today among teachers, we observe a tension between exploitation and exploration (Holland, 1975; Cyert & March, 1963; March, 1991). On the one hand, teachers show the tendency to adapt to strategies and consolidate practices (exploitation), on the other hand, some teachers try to experiment innovative solutions and develop new skills (exploration). Within this line of tension a small group of teachers, identified as 'digital teachers', 'on-line', 'innovators', experiment new didactic and organizational practices.

The potentialities offered by the network ask teachers more and more to abandon the role of speakers, who only transmits content within the asymmetric protected space of the teacher-student relationship, in order to become a tutor, a mentor, a coach, where the role is based on a direct, personal and parity relations. A relationship where teachers and students are co-protagonists of a shared growth path when cooperating to address common problems, without that one prevails over the other, but, on the contrary, according to a cooperative logic, to learn together. This is a role that requires new and more complex competences of: design, management, evaluation, communicative, relational and empathic nature, because it develops in a framework of parity relations aimed at the empowerment both of the subject and of the teaching community. A relation based on the principle of emancipatory, transformative, authentic and congruent communication (Rogers, 1970; May, 1989), according to the rules of the Socratic dialogue, in which the teacher plays a role in facilitating the learning process by overcoming the mere transmission of content.

Despite the absence of a digital policy able to lead educational institutions to a new school model (at least at the time of this survey), we can intercept a certain amount of innovative teachers capable of conducting research and experimentation, reflecting in a critical way about the use of technologies for educational purposes. The way through which students interact with technology at school, as they are mediated (including by the hidden curriculum) have an impact on how they will be able to attribute value to the search for deep understanding, to acquire awareness of their 'communicative action' (Habermas, 1980), to develop communicative skills that go beyond mere linguistic correctness; to be able to recognize the responsibility of all their communicative actions inside and outside the network. In other words, that "feel communicative" which is not only concerned with technical skills, but above all cultural and civic competences, expressed in respect of itself and of the other. IIn this process, a student is not conceived as an object, as a mechanistic and organicistic view of a positivist perspective, but as a subject, in a cognitive, dialogic and intersubjective perspective

that arises in front of the student not as an empty jar to fill with information and content, but as a thinking subject to be valued in its specificities. Paraphrasing Kierkegaard (1979), it is the transition from a communication principle oriented to objective thought to that related to a subjective thinking. The first one approaches knowledge as a predefined, predetermined, measurable object, something that can be accessed and consumed. A direct communication aimed at giving an objective knowledge, which is linked to a result-based educational approach. The second interprets the path of knowledge as a pathway of subjective reflection that is oriented toward one's inner being, not focusing on the *thing* but on *how*; it exalts the reflective, indirect and dialogic dimension. In this sense, teachers 3.0 are asked to exert strong social-relational and emotional competences and adequate awareness related to the degree of influence that these dimensions have on the classroom climate, students' engagement, their approach to study and to use digital technologies in learning and school performance in relation to the containment of discomfort or abandonment factors. Much more and very different from a matter of technical expertise. This means redefining spaces of autonomy and role boundaries that are better able to respond to new organizational tensions, specifying profiles, skills and professional values associated with them within the expected school model, where it is increasingly required to reflect and act relationally (Boccacin, 2011).

Emerging evidence proves that, in spite of the endowment in use and of a positive willingness to accept, albeit critically, the changes that have now taken place in society, the possibility of developing alternative practical knowledge, without new mental maps able to integrate innovation in reference contexts, is not capable of producing substantial benefits. The element of greater fragility is found in the difficulty of integrating digital technologies into ordinary didactic practice, too often unable to overcome mere transmission of knowledge to enhance the subjective and intersubjective dimension so deeply touched by the digital society. It emphasizes the need for profound reflection that is capable of considering the traditional recruitment and training paths of teachers, no longer fit to meet current needs. This should involve a formative and accompanying policy (at different levels) that can intercept their needs and create supportive actions, even in an incremental logic, by allowing teachers: to move among unpredictable complex action repertoire; to evaluate and make useful decisions to frame and to support their actions; to achieve digital citizenship; to ensure access and participation in the knowledge society; to promote the full digital awareness necessary to achieve digital inclusion, equality of opportunities and the use of the network in an innovative and creative perspective; but above all, attentive to the relational, social and inter-subjective dimension. All this happens today in the absence of clear and defined professionalization paths that help to

build a practical knowledge and habitus suitable to move within an increasingly "net-centred" socialization process, where schools are only one of the many broadcasting agencies, and not even the most important.

The challenge of the educational system in the digital era is to move from the transmission of knowledge to the understanding of social complexity. How the *capabilities approach* explains, this awareness can be achieved through the acquisition of skills that allow the subject to freely enjoy what is available for the full realization of her/himself, exercising, in a responsible perspective, her/his own abilities and choices in respect of the common good (Sen, 2005).

Consequently, also the ways and places through which teachers can find appropriate training opportunities for the development of their teaching agency should be reconsidered. Career recruitment, upgrading and career development policies with which these skills are recognized, valued and enhanced within the variety of contexts in which they are called to work are put to the test. Adapting educational agencies to change also goes through a significant overhaul of the traditional personnel policies that have characterized these systems to date (in particular, their absence) mainly from the strategic will and the awareness that digital innovation at school is before all a whole matter of policy which cannot be trivialized to the teacher's responsibility or to technological issues. As the OECD Report *Inspired by Technology Driven by Pedagogy* points out (2010, p.146), to favor the integration of digital technologies in school, we need to develop a systemic approach able to integrate the policy axis necessary to generate a long-term horizon in technology-based innovation in education. An innovation closely related both to the pedagogical and technological axes, that are the main domains when we talk about technology in learning and to the knowledge axis which poses three relevant challenges in the securing. the first one asks that sufficient knowledge base is ensured; the second one needs that knowledge is effectively disseminated; and the last remember the need that basic knowledge is really used. Too often, as this pilot research also shows, we run the risk that resources derived from researches, innovations and public investments and dissemination strategies are under-utilised.

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