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The Crowdmapping Mirafiori Sud Experience (Torino, Italy): an Educational Methodology Through a Collaborative and Inclusive Process

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ABSTRACT

The CrowdMapping Mirafiori Sud (CMMS) pilot project, carried out by the Polytechnic of Turin (Italy), involved the academic world (students and professors), the Mirafiori Onlus Foundation, the local administration and the community in a participatory and inclusive process. The district is a large area of Turin characterized by a high average age of its inhabitants and a high percentage of foreigners. The aim of the project is to identify and report, through the use of ICT, the obstacles that prevent residents - the most vulnerable categories - from using public space. In the start-up phase, it was not born as a PBL approach, but during the application the PBL was considered a development perspective in the educational experience starting from the students' proposals and the exchange of their skills, in the specific declination of the PBL approach known as community engaged learning. For students, this version of PBL has proven to be strategic in the implementation phases of the project, in particular in the mapping of interested parties and the data set and connections between networks of actors.

1. INTRODUCTION: THE LITTERATURE BACKGROUND

The well-known and consolidated principles of the PBL (De Graff & Cowdroy, 1997; De Graff & Kolmos, 2003; Ertmer & Simons, 2006; Haan, 2006; Hannafin, Hill & Land, 1997; Kolmos, Fink & Krogh, 2004; Lehmann, Christensen, Du & Thrane, 2008; Moust, Van Berkel, & Schmidt, 2005; Savery, 2006) have been applied and tested from a specific perspective in the teaching experience that we want to illustrate here. The project was in fact the subject of experimentation of the PBL approach in a perspective of development in the educational

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experience and also reasoning about the different roles of the teachers in orienting the problems in a multidisciplinary perspective. This application saw the PBL approach born on going with the training process and not, as usual, setting the PBL process *ex ante* as a learning mode. In particular, as Dahlgren, Castensson & Dahlgren (1998) assert, if both perspectives -a learning perspective or a teaching perspective- are taken in the development process, it is necessary to clearly define all the characteristic of the learning perspective: the learning process of the students and the two teaching perspectives, the supportive role or the directive role.

In the case of CrodwMapping Mirafiori Sud (CMMS), not born as a PBL approach (Section 2), all perspectives emerge in the project construction process, in which the students' activity, responsibility and influence on the education have emphasized and in which the supportive tutor's role have mainly focusing the group process, while the directive tutor's role have characterized by a restricted view or uncertainty of the teacher's role in PBL.

The perspective of this article, as stated by Hage, Leroy and Petersen (2010), sees the PBL approach emphasizing also society's active role in knowledge production, called the 'social learning' approach: thanks to the direct involvement in a real process, the students and teachers, relating to the stakeholders, are entitled to participate in the production of knowledge that regards them. Emancipatory aims are concerning processes of mutual learning, creating networks of expertise, and supporting less privileged groups (empowerment).

For the Italian debate, among the multiple contributions we mention Lotti (2018), Cantoni & al. (2018) and De Marco (2018), as the PBL approach is also re-read through the strategic role of multimedia technologies and learning such as Experiential Learning. For the CMMS the development perspective of the PBL in the educational experience has seen its declination in particular: 1) in the structuring in progress of the teaching strategies according to the "constructivist" inspiration (Rotta, 2007) of the Project Based Learning; 2) for the aspect of Service Learning (SL) or in-service learning, a theme emerging in international literature (www.europeengage.org) in pedagogical research. This particular focus is closely linked to the CMMS process, since the experiential learning has been combined within the curricular path, with the active engagement in the community (service) of students who relate with local stakeholders for community development: this is the well-known community based or community engaged learning (De Marco, 2018). On the basis of these premises, the contribution is divided into the following parts: the description of the case (paragraph 2) and its objectives and expected results, followed by its rereading according to the PBL perspective of development of the educational experience in the two meanings previously mentioned. In paragraph 4 the results are highlighted in light of this perspective and, finally, some future prospects of experimentation are traced.

2. THE CROWDMAPPING MIRAFIORI SUD EXPERIENCE (CMMS), TORINO, ITALY

The pilot project CMMS, carried out by the Politecnico di Torino (Italy), involved the academic world, students and the local community in a participatory and inclusive process. The genesis of the project did not include the application of the PBL approach and was focused on learning and involving a team of students on emerging issues of social innovation and collaborative processes. Social Innovation (SI) is a very broad concept and a domain in which many parties are studying development trajectories also in terms of innovative training methods and research dissemination. It is in this sense that the PBL approach was seen as a new experimentation perspective. Project Based Learning was applied in the evolution of the project and focused in this case: 1) on design through the Web Quest, which consists in starting from a search for online resources on a real problem by designing a critical presentation of the results obtained selecting the information; 2) on the use of new technologies; 3) on learning based on the close relationship between the development of skills and problems or teaching for problems (problem based) and the value of authentic learning for the development of citizenship and civic skills (Table 1). In CMMS one of the learning models was to encourage students to participate in the project activities by meeting the real needs of the community.

Learning Outcome	Definition	Sample Measures
Understanding Social Issues	An individuals' frame of reference that guides decision making in terms of complex social issues.	Diversity and cultural awareness and sensitivity; perceptions of homeless, elderly, disabled, different races or cultures; ethical and moral values and decision making; interpersonal skills; **understanding of the needs of the community; understanding how to help the community; a desire to engage in future service activities in terms of both a feeling of responsibility and a commitment to do so.**
Personal Insight	An individual's perception of self.	Identity; awareness of oneself in terms of strengths and weaknesses; career aspirations; self-efficacy; self-esteem; determination; persistence.
Cognitive Development	Task and skill development and academic achievement.	Management skill development; writing skills; problem-solving skills; critical-thinking skills; GPA; course performance.

Table 1. Learning Outcomes of Service-Learning (Yorio e Ye, 2012, p.11)

Many people recognize social innovation as a sustainable choice with which we can change our current societies, in a more democratic, sustainable and inclusive world. Social innovation addresses the creativity and needs of its citizens where the structures and rules of the system are unrecognizable, although formally democratic. Ideally, through social innovation we will be able to build a more democratic, sustainable and inclusive society. Given the above, the project was born as an educational experience and supported by funds for student activities. The work was conducted by a group of students and professors (30 students of master's degree courses in architecture, design and engineering, 3 doctoral students or doctoral students, 2 post-graduate fellows and 2 teachers) with the Mirafiori District, the Foundation of Mirafiori Onlus, local population and associations, with particular attention to the most exposed and vulnerable categories in terms of accessibility and usability of urban spaces. In the start-up phase it was

not born as a PBL approach: in fact, it was born as an educational experience that started from student projects and the exchange of their skills, but during the experimentation the PBL approach was identified as strategic for the aspects of problem solving in the phases of stakeholder mapping, research of data sources and data processing, in the identification of relationships and roles between networks of subjects and in the direct involvement in the process of interaction with the Public Administration. The educational experimentation in the "learning by doing" workshop has allowed the students to approach the theme of collaborative platforms and to decline it according to a problem solving approach: the team of 30 students, coordinated by 2 supervisor teachers, thanks to the articulation in groups of work for skills, during 6 months - both in the classroom and in the premises of the district and during inspections - have proposed high-tech solutions (*on line* modality) and solutions that allow to bridge the gap due to the digital divide of the population elderly or with mobility difficulties and with aspects of disability (*off line* modality). In fact, Mirafiori Sud is a vast area of Turin characterized by a very high average age of its residents and a high percentage of foreigners and by a strong proactivity of its inhabitants, thanks to the presence of a rich network of associations.

2.1 The aim, the context and the phases of CMMS

The aim of the project is to identify and report, through the use of ICT, the obstacles that prevent residents from using public space in their district. The information collected, processed and classified is made available through an online platform. Citizens, especially the most vulnerable (ie the elderly) are active subjects: they are asked to report problems and proposals, thus fueling a process of participation.

The perspective of the PBL approach has emerged as strategic on the part of the responsible teachers and coordinators to structure and plan the learning phases of the students in the process of involvement from below of citizens and interaction with public decision makers. In particular, from a preliminary phase of listening to citizens and neighborhood associations about their needs and their reporting on aspects of care of public spaces in the neighborhood, students had to face the reporting phase of this information and that of translation of qualitative data into thematic categories and into proposals also through the use of technology (development of encodings for digital platforms, social networks, sites, etc.). This passage highlighted how the PBL approach was strategic, in particularly from the theoretical-cognitive phase (knowing it) to that of the search for both technological and conceptual solutions through technical-operational learning (knowing how). Students also developed self-learning skills in connecting a large amount of information and knowledge to develop new ones. In the CMMS the key aspects of the participatory process were analysis, research and learning by making, strategic phases of the knowledge process. The perspective of PBL has emerged as interesting also in the process of involvement and learning of students in the demonstration phases of the use of ICT and crowdmapping during "transect walks", of data collection and their analysis and listening and comparison with all stakeholders.

The project was developed in two different phases. The first phase (2013)- this CMMS- is the pilot project to recognize the context and specify the method. In this phase, the PBL learning perspective focused, as previously underlined, in the preliminary phase of knowledge and translation of the needs of citizens, in the phase of presentation by the students of interactions with citizens (through interviews, data collection, supporting in the use of smartphones, etc.) and comparison with PA managers. Furthermore, under the supervision of the responsible professors, they developed the ability to draft the budget and translate accounting items into the project's expenditure items: this aspect was requested at the end of the workshop for the allocation of funding from the Polytechnic of Turin. The second phase (2015) -called the MiraMap project- started after winning the SIforAGE award, which provided innovative solutions to make citizens interact with the public administration, focusing in particular on the needs of older people.

CMMS was created with the aim of identifying and communicating, with the participation of residents and thanks to the use of new technologies, the obstacles (physical and cultural) that prevent residents from taking advantage of public space in the Mirafiori Sud district: the informations collected, processed and classified are made available through an online platform. Citizens, especially the most vulnerable such as the elderly, are an active part: they can report problems, proposals and even things that work well in their district, thus fueling a complete and transparent participation process. The project was conceived with the aim of generating a pilot experience that can be replicated in other parts of the city.

3. RESEARCH METHODOLOGY, PEDAGOGICAL FRAMEWORK AND ANALYTICAL TOOLS: THE PERSPECTIVE OF PBL APPROACH IN CMMS

The tool used for the project is the crowdmap, an open source platform designed and created by the Ushaidi team, a non-profit organization in Nairobi, aimed at collecting information collectively. The software offers tools that allow people to send information, using mobile phones or the internet, creates a temporal and geospatial archive of events and subsequently transforms the information collected into points on the map. The crowdmap is based on a participatory process: no longer a top-down action, imposed from above as a simple statistical study of a territory, but an approach that identifies people (the crowd) as the essential element for creating the map.

The CMMS is online and is available for residents and public decision makers. It is currently being implemented with the MiraMap.

The didactic planning phases of the CMMS process finds some consonances in the structure set out by Cantoni, Setti, Mosconi, Wang (2018, p. 3, Figure 1).

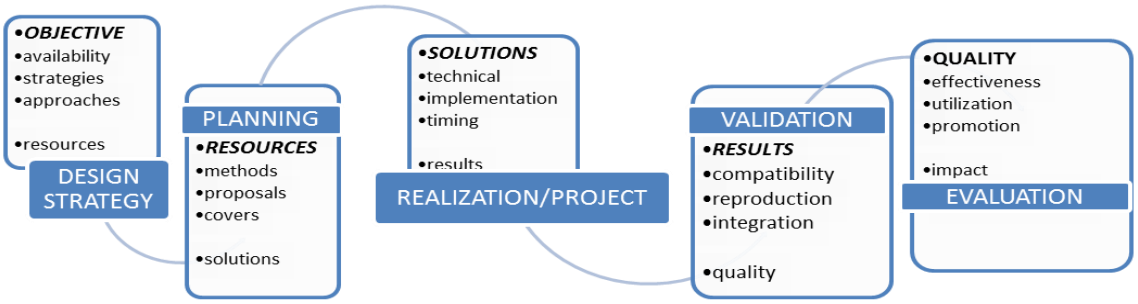

Fig 1. The five phases of realization of the process of problem based learning flipped classroom by Cantoni, Setti, Mosconi, Wang (2018). Source: *Author's translation by Cantoni, Setti, Mosconi, Wang (2018, p. 3, Figure 1)*

As reported in the Introduction, the PBL perspective of this real case is the process known as *community engaged learning.* The centrality of the issue of "problem solving" was immediately evident: starting from their native digital backgrounds, the students identified the critical issues for the target users of their generation and tried to find technological solutions. The PBL perspective has identified nodal learning aspects as: 1) the ability to conceptualize issues related to the use of public space, 2) the ability to use ICT, 3) the development of communication capabilities of complex messages in messages understandable to the common citizen, 4) interpersonal skills with research groups, decision makers and groups of citizens' associations. To make the tool more accessible and easy to use, it has become necessary to implement the possibility of using text messages to send information from any type of mobile phone, not only from a smartphone. It was precisely during this complex phase that the student team tried its hand at the testing phase of the CrowdMap platform, through moments of verification and validation of the information received, and during the publication of the reports on the map.

4. ANALYSIS AND RESULTS: THE PBL PROBLEM SOLVING APPROACH

The research process adopted highlighted the following six levels of investigation in order to better recognize the context and specify the method for the next phase: we highlight those in which the perspective of PBL learning was more evident.

1. *Kick off.* A necessary phase of identification, contact and meeting with local actors and representative of the categories identified as "vulnerable".

2. *Definition of Criteria.* It is at this stage that the PBL approach seemed strategic to structure some student learning themes. In fact, the definition of criteria and categories for the

crowdfunding process has been a crucial phase in the problem solving approach proposed to students and subsequently to citizens' associations during the consultation phase. Thanks to the interaction with local actors through a series of "transect walking" (Figure 2), a reflection on criteria, categories, standard identification of the phenomena to be reported, has been set for a coherent achievement of a database, which allowed students to develop information translation skills in alphanumeric terms.

3. *Set up.* Starting from inputs acquisition from the local actors, the Ushahidi platform has been set up, then a website was designed to host all information and news. The comparison of students with IXem Labs, Department of Electronics and Telecommunications of the Polytechnic of Turin has initiated a phase of deepening knowledge and development of computer skills.

4. *Training.* With the support of the Fondazione della Comunità di Mirafiori Onlus, a group of 30 inhabitants was selected for collecting data on the area, and stimulating the 'crowd-mapping' effect. The students, the researchers, the PA with its technicians, the Fondazione Mirafiori non-profit organization and the associations - all together - have participated in some programmed "listening" moments.

Fig 2. The transect walks. Source: *https://areeweb.polito.it/mapmirafiorisud/wp-content/uploads/*

5. *On field data collection.* During June and July 2013 the group formed by the university students and the involved citizens made several data collections in the neighbourhood, sending information direct from mobile phones, app and computers to CMMS website, email and numbers. Once the information was received, it was checked for approval and then, if appropriate, was made visible on the map.

6. *On line.* Once the data collection was completed, outcomes were published, widely presented and made available to all the stakeholders involved and to the local administration. The mapping of the stakeholders through a hybridization of methods (Gephi model, Mendelow Method and CIA) represented an important moment of learning by the students with a PBL approach (Figure 3).

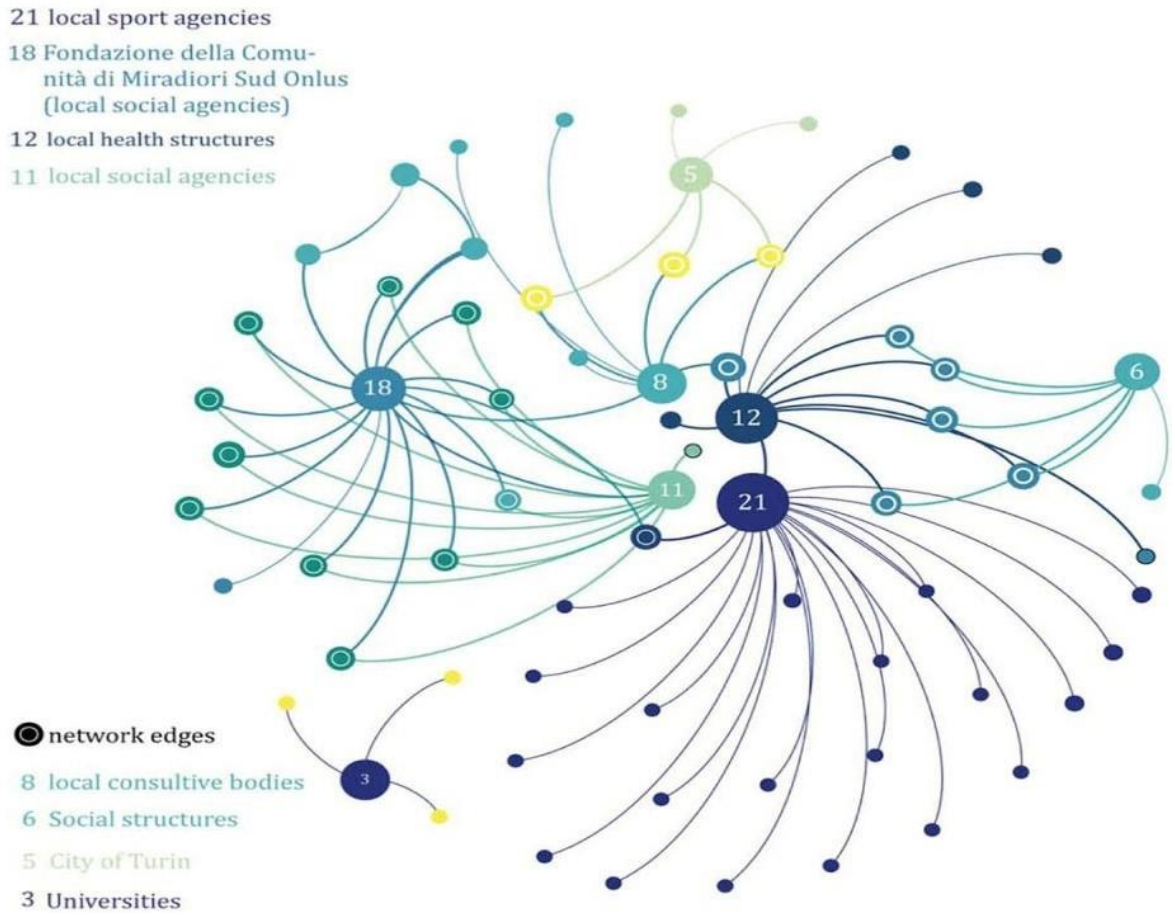

Fig 3. The stakeholders map: The Gephi Method. Source: *De Filippi et al., How..., 2017, p. 34*

7. *Monitoring and evaluation criteria of ex-post impact*. The criteria have been set up on the basis of the Community Impact Assessment/ Evaluation (CIA/CIE) methodology that evaluates in a descriptive manner the impacts - monetary and non-monetary - derived from the project in relation to the various actors involved.

5. CONCLUSIONS AND EXPECTED OUTCOMES

Several of the project's outcomes, in particular two according to the development perspective of the PBL approach: 1) the use of the platform by students and users is not limited to only identifying and reporting individual interventions (knowing the problems), but forces them to analyze phenomena on an urban scale: this has resulted in and will entail capacity for students to deal with complex problems; 2) the participation of local authorities, to build and strengthen their "accountability”.

The central theme of the community engaged and of the service to the community to configure itself as a driving force for community empowerment did not appear as a hairpin or "immediately" by the community but it was substantiated with the storytelling by the students of the stories and the memory of the specific one community. Furthermore, if the service learning is problem based, it is oriented towards research and the solution of real problems connected to the life of the community to which it belongs, the role played by the students was that of consultants who have flexibly adapted their knowledge to requests, to the problems of the community in order to intercept possible solutions. The process is found to be non-linear, rather complex and complex necessarily mediated by the cultural, social and economic "stories" of the communities.

In the new MiraMap project, currently underway, which acquires and develops all the results achieved by the CMMS, we highlight training nodes indicated by the student team, with which they have ventured during the 6 months of workshops: 1) the restitution and visualization of the concentration or distribution of the data on certain areas, as well as the mapping of the different categories are not "cold" data, but has the intent to support the PA and citizens to think in terms of programming, for example of micro-interventions on some areas or maintenance activities of residual public spaces, 2) the strong demand for follow-up both by citizens and stakeholders; 3) the positive collaboration to define and categorize existent social and economic resources within the territory in order to better address shared needs and real resources analysis; 4) the participatory approach that accompanies and demonstrates each phase of implementation, testing and return of results.

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