The WISE project and the support for social/educational inclusion

Draft of:

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Abstract

Problems due to physical or health disabilities which are either congenital or have been acquired through traumas or degenerative diseases, often hinder normal participation in school, university or professional education and training, either temporarily or permanently.

Can network and mobile technologies offer new opportunities for proper social/educational inclusion in these cases?

This is the key question which from 2009 to 2012 guided the research and development of the project known as WISE (*Wiring Individualized Special Education*). The project was funded by the Ministry of Education, University and Research (MIUR) with the funds for investment in basic research (FIRB).

The main aim of the project was to develop a support system for the education and special training of so-called *homebound*[1] subjects, those who for physical or health reasons are confined to their homes or other closed environments (hospitals, temporary homes). Essential parts of the WISE support system are: tools for sharing the knowledge and good practices of homebound special education (HBSE); the assisted planning of educational interventions directed at a special user base; the training of social/educational workers.

1. A patient is considered "homebound" if leaving home requires a considerable and taxing effort, and the patient doesn't go out very often or for short periods, or it is medically inadvisable. Generally they are unable to leave home without the aid of crutches, walkers, wheelchairs, or another person's assistance. Note: Aged persons who stay at home due to feebleness or concerns about security are NOT considered homebound (http://www.medtronicsofamordanek.com/spineline/hospital/definitions.html).

The project was developed through the combined action of six Research Units (RU), coordinated by the Institute for Educational Technology (ITD) of the Italian National Research Council (CNR), and belonging to six university centers of excellence specialized in research on the educational use of network technologies.

This chapter will present the main features of the project, together with the results deriving from it in terms of research and prototype development.

Introduction

There has been a long succession of projects aimed at exploring and experimenting ICT potential in the education of disabled and/or long-stay patients.

Although these projects have undoubtedly contributed to a general idea of how effectively to introduce technologies to support special education, each of them has usually concentrated on specific situations and/or problems: sometimes on the technological aspects, such as hardware aids for the disabled or communication technologies for long-stay patients; other times on the psycho-pedagogical aspects, such as use of ICT for reinforcement and/or catch-up in cognitive-type disabilities, or for motivating/enriching and lending continuity to the learning process in temporary or permanent home confinement.

It is a continually-expanding universe of experience, each experience being almost always unique given the complexity of the population of this particular educational environment, a population which is determined by a huge number of variables: from the type of disability and its seriousness, to the subject's psycho-physical condition, to the context in which they live, to the educational path which they intend to follow or are intended to follow, etc.

This complexity suggests that great caution must be used in preparing research on the personalized educational use of ICT, since not only the pedagogical but also the psycho-social aspects must be borne in mind. For example, while in using technology in "normal" education it is possible to suggest personalized paths and materials even automatically, through careful profiling of the student, in the case of the disadvantaged subject, because of the greater importance of the psycho-social factors, the "human component" (e.g. the teacher, the psychologist, etc.) must analyze each situation singly in order to define the best strategy for the educational use of ICT. And the key role of the workers here, more than in other educational contexts, means they must always be on hand to support the search for solutions to situations which are constantly new. Hence the importance of ICT in special education, not only as a teaching aid, but also as a tool for fostering synergic actions both of the horizontal type, i.e. among those working in contact with the disadvantaged subjects, and the vertical type, i.e. between the world of research and its potential user base.

It is into this particular context that the WISE project fits (Trentin, 2009). Its particular research field is that of homebound special education (HBSE), i.e. the education/training of those who are confined to their homes because of physical or health problems.

Project background and genesis

Before describing the project and its main scientific and prototype results, it is perhaps useful to understand where WISE 'comes from', that is to say the long period of study which preceded it and brought it into being.

WISE inherited the body of ITD-CNR experience accumulated over fifteen years of research (1994-2009), during which various important projects were conducted on the social/educational inclusion of students who are unable to attend school or other types of education regularly (Figure 1).

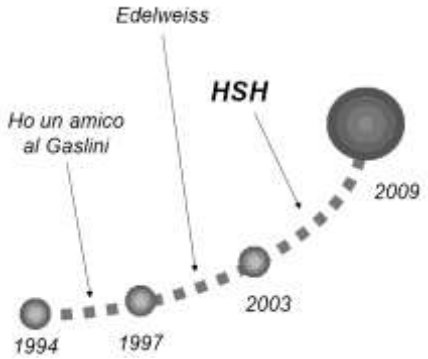

Figure 1. The pre-WISE research path.

Important stages of the research path have been:

[1994-1997] *Ho un amico al Gaslini* (ndt. literal translation: *I've got a friend at the Gaslini Pediatric Hospital*). This is the project in which ITD-CNR began its research into the use of network technology to support the learning of students who have difficulties with normal school attendance. The project was developed wholly in the context of the "Giannina Gaslini" Pediatric Hospital of Genoa, in collaboration with the Genoa/Sturla School District and numerous teachers inside and outside the hospital. The web technologies in this first project had the essential aim of guaranteeing email contact between the young patients and outside classes, a contact which was used in various ways, ranging from simple social interaction to the patients' involvement in short educational activities in collaboration with students from outside classes.

[1997-2003] *Edelweiss*. In 1997, Hewlett Packard Italy got to know about the project being developed at the Gaslini hospital, and as part of the philanthropic action *K12-Project of HP Europe*, it donated a considerable number of last-generation notebooks to the hospital, thus increasing the number of young patients who could be involved in the collaborative educational activities inside and outside the hospital (Trentin and Benigno, 1998). Edelweiss could thus be extended to various school levels, generating the projects *Florindo* (for primary school and first-level secondary school) and the *Castello della Maga* (ndt. literal translation: *The Enchantress's Castle*), transversally covering all school levels including second-level secondary school.

[2003-2006] *HSH@Teacher*. In the wake of its experience gained in the hospital teaching ambit, ITD-CNR was asked by the Ministry of Education in 2003 to set up and conduct a

specialized training project for hospital and home teachers on the educational use of ICT. HSH@Teacher was part of the more general MIUR project known as HSH@Network (Home-School-Hospital@Network). Besides the specific training goals, the training project HSH@Teacher aimed to foster the creation and/or consolidation of stable professional communities of teachers operating in those particular contexts.

The project provided an extraordinary opportunity to open up a new research line on the social/educational use of web resources, specifically in home education (the school which enters the home), which in those years was at its earliest operational and regulatory stages. It was in fact the first official recognition in Italy of homebound special education for school-age students.

[2006] *Announcement of Competition FIRB 2006* - With D.D. (Directorial Decree) No. 2691/Ric./2006, the Ministry of Education, University and Research (MIUR) issued an "invitation to present proposals for interventions aimed at potentiating research structures of scientific excellence operating in the field of experimental and special pedagogy", to be financed with the funds for investment in base research (FIRB). This immediately seemed to be an opportunity to propose something on HBSE themes, something however which would go beyond the school context and extend to university and professional education (Figure 2); in any case putting to good use the experience already acquired in home education for school-age students.

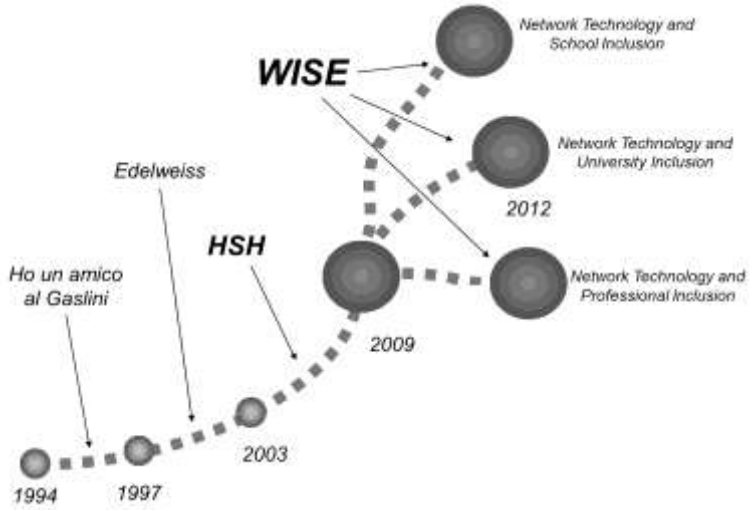

Figure 2. WISE and its research contexts.

It was from this embryonic idea that the WISE research group was set up in 2006. It consisted of the following six Research Units from six different Italian university and CNR centers of excellence:

- ITD – Institute for Educational Technology (ITD), National Research Council (CNR) – Genoa (head group);
- CELFI – Centre for E-Learning and Integrated Training, University of Macerata;
- CRMPA – Centre of Research on Pure and Applied Mathematics, University of Salerno;

- LTE – Laboratory of Educational Technologies, University of Florence;
- METID – Innovative Teaching Methods and Technologies, Milan Polytechnic;
- CeRiForm – Centre of Studies and Research on Educational Policies, Sacro Cuore Catholic University, Milan.

Disability, education and training: some data published around the WISE presentation period

What particularly strengthened the conviction of the research group to concentrate on HBSE was the reading of the ISTAT (National Institute of Statistics) findings of that period[2], which showed how serious walking problems strongly influenced the low educational level of disabled subjects.

The problems were related not only to the specific pathology but also to the organizational difficulties of identifying the educational source and bringing it home, as well as the high costs involved in this.

The ISTAT statistics also revealed that the population affected by this problem was numerically far from negligible (Table 1).

Table 1. Data published[3] around the presentation of the WISE project.

Non-elderly people with disabilities	***1.650.000***
• with medium/high disability	76.0 %
• motor area; 12.0% sensory/motor area	38.3 %
• limitations due to health problems	8.6 %
Enrolments in a school/university course	***114.000***
• attend public structures	90.9 %
• high degree of disability	7.8 %
• with sensory/motor problems	26.5 %
• declare great difficulty in attendance	30.3 %
Working world (15-67)	
• change jobs after first placement due to worsening of health	19.2 %
• onset of disability after first job placement	37.0 %

Moreover, more than a third of disabled people over 15 years of age did not possess any certificate of education, while about 54% had obtained an elementary diploma and from 8% to 12% had secondary school leaving diplomas or degrees.

A significant finding from that period came from the university context, where the trend of disabled students was decisively on the increase: in fact in the five-year period 2000-2005 there was a 90% increase. Here, the distribution of the types of disability showed that students with motor disabilities were the highest percentage (30.8%), lower percentages being seen for students with mental difficulties (3.2%) and dyslexia (0.7%).

2. http://www3.istat.it/salastampa/comunicati/non_calendario/20100513_00/.
3. http://www.disabilitaincifre.it/indicatori/istruzione/istruzione.asp.

The WISE scenarios

WISE research activity had a wide reference scenario, ranging from the educational (school and university) to the adult training world.

In the first case, the above-cited "home education" (HE) was given particular importance. Its aim, based on an agreement [4] between the Ministries of Education and Health, was to guarantee continuity for the education of long-stay patients (or patients subject to repeated treatments). Already at the time of presentation of WISE it was clear that HE was destined to expand continuously, for at least two reasons: an economic one, due to the reduction in hospitalization times and the consequent increase in home confinement periods, albeit supported by health services for Integrated Home Assistance (IHA); secondly, the new situations of social/health distress (particular allergies, forms of anorexia, behavior disorders, periodical administration of life-saving drugs), which also cause interruption or discontinuity of school attendance. Hence a very complex context in which, in far-off 2007, the possible role of web technologies was practically unexplored; in particular, in fostering learning/teaching processes and in amplifying possible synergies among teachers, family members and health/psycho-social workers in the educational process of the students concerned.

In the second case (homebound adults), one of the problems the project decided to address was that of subjects already instated in the working world who, because of an accident or a particular disease, are forced to leave it, and are consequently seeking to give a new shape to their lives: sometimes going back to studying; sometimes seeking online opportunities to train for a new profession which allows them to re-enter the working world, almost always through distance computer work (tele-work). In these specific situations, the goal of WISE was to contribute to the working out and setting up of good practices which might reinstate subjects with acquired disabilities (which are often perceived as a social problem), i.e. creating the conditions for them to be considered once again as a resource for the community.

Although the subjects and groups we have briefly cited as examples were the reference recipients for WISE research, the project actually intervened on a wider and more varied range of subjects and contexts, such as teachers, health/psycho-social workers, family members, researchers, associations, bodies, indeed all those who populate the WISE operational contexts under some guise or other. Among these, for obvious reasons, particular attention was paid to educational and training staff, first and foremost to teachers and trainers.

The aims of WISE

Since the number of problems addressed in WISE was vast, the research group gave priority to the following two macro-goals, in order to avoid excessively widening the scope of the research, which would lead to the risk of not clearly identifying the key elements for the development of HBSE methods and support tools:

4. http://www.pubblica.istruzione.it/news/2003/prot_salute.shtml.

- creating a support system for those involved with various roles in HBSE, aimed at systemizing the data acquired on the use of the web in special education, promoting knowledge of them, and their propagation and sustainability, on as wide a scale as possible;
- promoting base research on new methodologies, teaching strategies and technological supports which can be dynamically adapted to learners' needs and can support them in the learning process; at the same time defining methods for measuring the efficacy/results of said methods and technologies.

The aims of the project were pursued systemically, both in identifying the problems and in working out corresponding solutions. In this sense, research activity was developed in three main stages:

1. analysis and modeling of WISE contexts and user base, and planning of the different parts of the HBSE support system;
2. implementation of the technological prototypes and parallel actions of diffusing HBSE-related knowledge and skills, as well as direct interventions on specific study cases;
3. experimentation and validation of the prototypes (see point 2 above) on a selected user base sample, and their subsequent revision.

The WISE systemic view

It is as well to specify straightaway that by the term 'system' we do not mean here only the 'tangible' components of WISE (portal, social networks, knowledge bases, prototypes of network-based learning environments, etc.), but something wider. Something which is able on the one hand to facilitate the aggregation of human and technological resources already present on the web, and on the other hand to enable WISE to reach into the 2.0 space, making its resources and methods available and creating a kind of sustainable expansion of the system, centered on horizontality and self-replenishment.

In this sense, the support action performed by the WISE system, combining informative, educational and relational aspects, had the following goals:

- making available an info-knowledge space for the sharing of: projects; experiences; knowledge on methods of intervention (training strategies, local/national policies) and already-available resources/services; information on bodies operating in the specific sector;
- creating a meeting-point between educational demand and supply, also with a view to possible reinstatement in the working world (in the case of adults);
- offering methodological/planning assistance/training for those intending to develop new educational resources (materials, training courses) starting from specific situations, or those intending to set up fully-fledged systems/services destined for the training of homebound subjects (at school and university, in professional training);

- providing a social aggregation space both for those directly or indirectly involved in the education/training of the reference subjects, and for the subjects themselves.

The tangible components of the WISE support system

As we have said, WISE substantially addresses two complementary problems (Figure 3):

- the sharing and development of knowledge and good practices for HBSE;
- the teaching of the final user base and the training of the staff.

In order to support these actions, specific technological aids were created in the three years of the project which could be used online: the tangible components of the WISE system.

Regarding the sharing and development of knowledge and good practices, the following were created:

- a hub of information and knowledge about WISE contexts (hereafter indicated as Knowledge Hub);
- a hub of online communities used in WISE contexts.

For teaching and training on the other hand, the following were developed:

- a support environment for the planning of special teaching (hereafter indicated as $ePEI_{WISE}$)[5];
- online self-learning training modules destined for those directly or indirectly interested in/by WISE contexts.

Figure 3. The two lines of action of the WISE system and the relative technological supports.

5. PEI (Percorso Educativo Individualizzato) stands for Individualized Educational Path.

The knowledge hub

The main aim of the knowledge hub (KH) (Mangione et al., 2013) is to govern the processes of knowledge management and sharing linked to the WISE contexts, relying both on the collection and cataloguing system developed during the project, and on the Web 2.0, where resources shared by those variously involved in HBSE have existed already for some time.

In other words, while the information and knowledge filtered and developed by WISE flow vertically towards the user base, the horizontal flows, typical of Web 2.0 guarantee access to deposits of "raw" material which can be used freely and/or selectively.

For the management of both the vertical and horizontal flows, the KH offers mechanisms for recovering information on a semantic basis, as well as a detailed user modeling process inspired by ICF (International Classification for Functioning) principles[6] and designed to tailor accesses (modes of interaction, language, etc.) to the specific subject interacting with the system (homebound learner, teachers/trainers, family members, researchers, etc.) (Alvino and Benigno, 2010).

Online community hub

One of the main aims of the system is to facilitate the building up of stable links with those realities which are already moving horizontally inside the web space. It is well known that for some time many issues linked to "special" teaching have been addressed through online community interaction.

For this reason, we realized, right from the beginning of the project, that it would be illusory to think of attracting into the WISE interaction spaces communities which were already functioning on Web 2.0.

This led to the idea of a support environment aimed not so much at "incorporating" the existing ones, as at "being offered hospitality" by the existing ones, in order to make itself known, to open up channels of sharing and interaction, to offer itself as an authoritative reference point whose goal is to act as a hub for the various social networks already operating in the HBSE context.

The support environment for didactic/educational planning (ePEI$_{WISE}$)

We are speaking about an online computer environment to help the planning of individualized educational paths (ePEI$_{WISE}$), i.e. an environment which is able to offer guidance in designing and/or aggregating educational materials and paths (Pettenati et al., 2011).

The reference knowledge base used to guide the planning derived both from a meticulous mapping of existing special education models, and from the new models worked out during WISE, which center on the use of 2.0 resources.

Users of the environment are first and foremost the teachers, even though in theory ePEI$_{WISE}$ might be used by homebound subjects' family members or by the subjects themselves, to organize individualized self-learning paths.

6. http://www.disabilitaincifre.it/documenti/ICF_18.pdf.

The educational environment

A critical element for the sustainability of any innovation process is its wide-scale diffusion, and this cannot occur without the potential user base being adequately informed and acquiring improved skills.

For this reason WISE, besides including face-to-face educational events with university/school teachers and professional trainers, also planned to develop an online educational course on HBSE, to be used in self-learning mode and intended for all those directly or indirectly interested in/by WISE contexts.

The online educational course (*WiseLand*[7]) is particularly rich in potential and perhaps more than just a simple prototype. It is aimed at school teachers, and addresses the theme of homebound teaching. Besides its priority aim (teacher training), WiseLand has been conceived to act as a model for the development of similar educational environments for other WISE contexts (university and professional training).

The WISE scientific network

To lend scientific robustness to the research for developing the above-mentioned prototypes, and more generally to the whole support system offered by WISE, particular attention was placed on the synergic action of the research units of the project, which were organized into a network for sharing their respective skills: special and experimental pedagogy; advanced technologies; educational psychology; special psychology; didactics; knowledge management and sharing.

The network gradually extended to similar national and international structures, sometimes generating specialized sub-networks, as for example the Liguria Network of WISE[8]. This specifically deals with problems connected to the distance-training of homebound subjects, with the aim of inserting/reinserting them into the working world also in distance-working capacities (tele-work).

WISE & beyond

The three years of FIRB funding have undoubtedly been a breath of fresh air for research already begun on HBSE, offering an extraordinary opportunity for furthering this research and extending it to different educational and training contexts. However, to make sure the end of funding did not lead to interruption of the scientific activities which had been started and/or extended during the project, WISE was also used as an incubator for new initiatives, in the hope of attracting further resources, so as to lend continuity to what has so far been done thanks to the ministerial funding. An example of these initiatives are the ones in which the ITD-CNR is currently involved, which extend to all three of the WISE contexts (Figure 4):

7. http://polaris.itd.cnr.it/kitdom (Italian version only).
8. http://www.wisefirb.it/sezioni-aggiuntive/community/La_rete_ligure_di_WISE.

- *TRIS (Web Technologies and School Inclusion)* (2012-2015),whose purpose is to study and try out new didactic models of intervention for students who are temporarily or permanently unable to participate in normal education due to psycho-physical problems (emotional disorders; physical/motor disabilities), or to serious pathologies (long-stay hospitalization or cyclic hospitalization for particular treatment protocols; multiple chemical sensitivity), or to particularly disadvantaged geographical situations (students living on small islands, in mountain areas). The project is based on funding from Fondazione Telecom Italia according to a framework agreement signed in January 2013 between MIUR, CNR and Fondazione Telecom Italia.
- *SCINTILLA (Innovative Scenarios of Distance Training for Insertion in the Working World in Liguria)* (2012-2014), which aims to set up an integrated system model of support for the orientation, training and instatement/reinstatement into the working world of homebound adults, as well as the conditions for its sustainability. The project is based on funding from the Liguria Region and involves the Liguria Network of WISE.
- *WEL&Inclusion (Web –Enhanced Learning and Inclusion)*, an initiative planned in collaboration with the University of Eastern Piedmont, aimed at defining and trialing a faculty training approach on web-based special education, so as to facilitate the educational inclusion of disadvantaged students, with particular reference to those with specific learning disabilities (SLD).

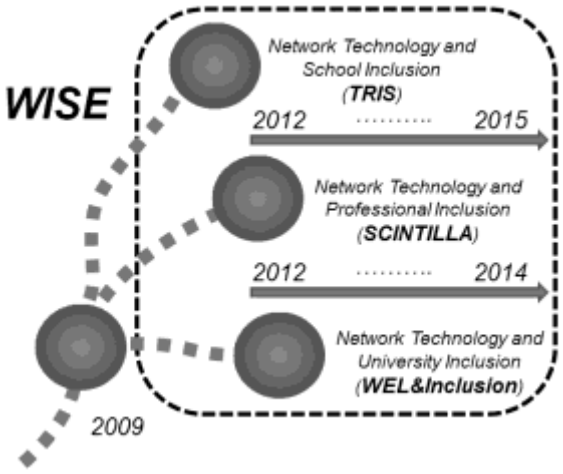

Figure 4. WISE & beyond.

Conclusions

This chapter has illustrated the essential features of the FIRB project known as WISE, as well as its main results.

One of the aims of the project, right from its beginning, was to guarantee the future of the research which has been developed in the three years funded by the Ministry of Education. In other words, attention was given to attracting interest and consequently new resources, so as to allow the WISE research groups to continue working beyond the formal expiry of the FIRB grant. This position developed from the experience that very often, when complex projects

like WISE come to an end, we feel we are standing in front of a series of open building sites, with highly specialized staff, which however need to be closed because the financial support, which allowed them to open and operate for a certain period of time, is no longer available.

In any case, what the WISE researchers have understood, created and propagated in terms of models, prototypes and cooperative networks constitutes a legacy of knowledge and resources which we have the duty to capitalize on and exploit, setting up new initiatives and research activities regarding HBSE.

We will be able to say whether WISE has sown fruitful seeds only after some time, that is to say when we have more precise indications as to the sustainability of its technological and methodological proposals.

Some decidedly encouraging signs in this sense are however already arriving from teaching and training structures. The recent agreements and conventions with the Ministry of Education and the Liguria Region have been cited in this chapter as an example. Although these are initiatives whose priority is methodology and technology transfer (too often ignored in research projects), they do also offer the chance both to delve more deeply into inadequately-explored HBSE problems, and to perfect the prototypes which have emerged from the project, adapting them to some specific operational realities. And it is for this reason that such transfer initiatives are not and must not be understood as exclusively one-way. On the one hand in fact, attention and curiosity have been attracted by the results of the research; on the other hand, the numerous experiences of people who have to deal daily with disadvantaged situations must absolutely be taken into consideration and capitalized, trying to understand how technology can act as a real support in such a difficult task.

The WISE research group has always been fully aware of this; for this reason, to close our chapter, we take the liberty of quoting Andrea Canevaro[9], whose words aptly mirror our own experience:

"….often, it is those who experience problems not only at close hand but actually as part of their lives who produce true innovation. There are many workers, disabled people's family members, and the disabled people themselves who, approaching technologies as 'artisans', succeed in 'discovering' and 'crafting' the right tools for a specific need. It is creativity as a discovery of different relations among known objects, the same creativity which in recent years has tamed Web 2.0 and allowed us to pass from consumers to 'prosumers' producers/consumers), who are able to decide what is needed and contribute to produce it."

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9. From an interview with Andrea Canevaro on the occasion of *Handimatica 2012*. http://www.asphi.it/Notizie/2012/Handimatica2012/Handimatica2012.htm. Andrea Canevaro is considered the father of special pedagogy in Italy.

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