

***Educating the Educators Involved in Homebound Training and Work  
Inclusion: Network and Mobile Technology for  
Online Training and Smart Work***

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**Abstract** — *Subjects with physical and sensory disabilities are frequently alienated from the social and production contexts. This type of alienation may lead to the worsening of the disabled subjects' health conditions and an impoverishment of their human relations, which in turn might cause identity crises and a tendency to greater dependence on others, culminating in loss of inclination and ability to learn new skills.*

*Since 2013, the SCINTILLA project of the Liguria Region (Italy) has set out to study how information and communication technology can be used to support work inclusion processes for subjects with congenital or acquired physical disabilities which make it difficult for them to move around (hence the common definition "homebound").*

*This paper will deal with one of the key aspects of the project, i.e. how to educate the educators whose task is to train and accompany young homebound subjects with serious physical disabilities in the process of work inclusion.*

*The specific aim of the paper is to describe the assessment model adopted by SCINTILLA for the training programme, which is inspired by Kirkpatrick's four-level evaluation model.*

*It will thus describe (a) the training programme conceived for educators called upon to train homebound subjects for insertion into companies with the "smart work" approach; and (b) the model worked out for evaluation of the above training programme, a sort of transversal model comprising formal, non-formal and informal learning dimensions.*

## INTRODUCTION

In December 2006, the United Nations Convention on the rights of disabled persons was approved [1], and was ratified by Italian Parliament with law No. 18 of 3rd March 2009. The Convention aims at breaking down obstacles, barriers and prejudices by defining a new policy for disabled people. It is based on protection of human rights and intervenes in all fields of life, including work.

At Article 27, regarding “work and occupation” we read as follows:

*“States Parties recognize the right of persons with disabilities to work, on an equal basis with others; this includes the right to the opportunity to gain a living by work freely chosen or accepted in a labour market and work environment that is open, inclusive and accessible to persons with disabilities. [...]”*

Subjects with physical and sensory disability are very frequently alienated from the social and productive contexts. This alienation may bring about the worsening of their health conditions and the impoverishment of their human relations, which might in turn cause identity crises and a tendency for greater dependence on others, culminating in a loss of inclination and ability to learn new skills. It is moreover now accepted that one of the key elements of the social integration of adults is their insertion into the production process [2][3].

The SCINTILLA<sup>1</sup> (SCenari INnovativi di Teleformazione per l’Inclusione Lavorativa in LiguriA - Innovative Scenarios of Tele-Training for Work Inclusion in Liguria) project, conducted by the Institute for Educational Technology (ITD) of the National Research Council (CNR) with funding from the Liguria region, neatly fits into this context, aiming to study how mobile and internet technologies can be used to help training and work inclusion processes for subjects with serious physical disabilities who are confined to their homes (thus often referred to as “homebound”).

The interest in mobile technologies and network services based on the “cloud” is due to the important changes that these are introducing into organisations, revolutionising

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1. The acronym translated means “spark”.

their production processes. These changes allow new forms of work management, e.g. so-called “smart work” (SW) [4][5]; this offers the possibility of carrying out work activities which are unconditioned by time and space, favours a more flexible organisation of work, and allows greater individual autonomy, at the same time fostering collaborative processes.

In order to better define the new but still-evolving production model we might use the strongly evocative concept of “Ba” proposed by Nonaka e Konno [6], i.e. a space which can be physical, virtual or mental or all these dimensions together; this space vehicles knowhow acquisition in organisations by means of peer sharing. In our post-Ford society, therefore, the term “flexibility” has taken on a more positive meaning, indicating not only the ability to adapt to change, but above all the chance for learning, self-renewal and self-enrichment [7].

In the case of work inclusion for the disabled, employers must be willing not only to accept the new production model, with everything this implies in terms of organisation, but also to acquire further skills [8], as for example the ability to identify the most suitable task for the worker’s specific disability, and the ability to assess the relative performances [9]. Acquisition of these skills may be helped by close collaboration with professional educators [10] who have been specially trained also in the role of “disability manager” [11], i.e. facilitator in the mediation between disabled workers and the company.

In all this it must be emphasised that it is often such extreme situations which act as “Trojan horses” for the systematic introduction of forms of SW into organisations. In other words, the need to find solutions for the working inclusion of disabled subjects has often stimulated wider reflection on how to extend such practices also to other situations in the organisation.

It is thus easy to imagine how the opportunities offered by new technologies and internet services have captured the attention of people concerned with the training and work inclusion of homebound subjects.

## THE KEY ISSUES

In previous projects conducted by the ITD-CNR [12] in the context of the training of homebound workers, two key issues linked to the work inclusion of these individuals emerged:

- the need to obtain new, more sustainable forms of support for their basic and continuous training, professional qualification and work inclusion;
- the need of the EFPs (Enti di Formazione Professionale - Professional Training Bodies) concerned with work inclusion to educate their operators in the use of specific methodologies for online training interventions [13]. For these bodies in fact, experimenting with methods based on the use of mobile and internet technologies is a necessary step when dealing with users who might find unique opportunities for education and insertion into the production cycle in internet training and smart working; opportunities which are moreover tailored to individual needs and thus maximise their social and working potential.

All this is in line with the indications of Art. 26, point 2 of the aforesaid 2006 UN Convention:

*“States Parties shall promote the development of initial and continuing training for professionals and staff working in habilitation and rehabilitation service [...]”*

Thus the main research activities of the SCINTILLA project concentrated on:

- planning and experimenting a training programme for educators (with a continuum between formal, non-formal and informal learning) which addresses both e-learning and online training methods, and smart work;
- working out and implementing an evaluation model for the whole training process.

## THE TRAINING PROGRAMME FOR EDUCATORS

The main feature of the training programme for EFP trainers, as we have said, is its extension over the three dimensions: formal, non-formal and informal (Fig. 1).

The *formal stage* was expressed in a basic training course conducted completely online and planned and managed by ITD-CNR staff.

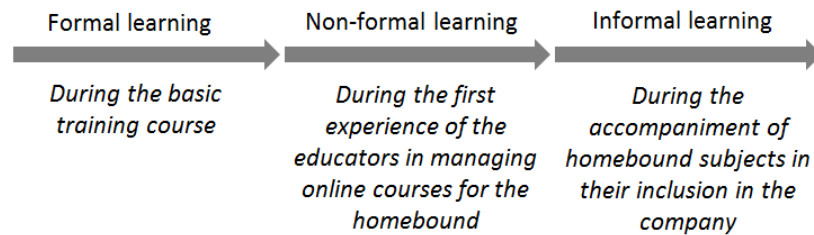


Fig. 1. Development of the training programme over the formal, non-formal and informal dimensions.

The *non-formal stage* was developed when what had been learnt in the basic course was put into practice in the educators' first experience in (a) educating a group of homebound subjects online with regard to the professional technological content required by the firms into which they were to be inserted, and (b) interacting with the firms to favour their students' working inclusion in SW mode. In this stage, the ITD-CNR staff took on a backstage support role for the educators, offering operational suggestions whenever they retained it opportune.

The *informal stage* consisted of accompanying the homebound subjects during the work inclusion process: an informal type of learning arising from the periodical search for solutions in the delicate initial stage of work inclusion, when young homebound subjects' needs and those of the companies willing to take them on board need to be harmoniously matched.

The evaluation process for the whole training process was inspired by the model of Kirkpatrick [14], which is divided into four levels (reaction, learning, behaviour, result), each of which has a direct bearing on the following ones. Before describing the evaluation model, we felt it opportune to give some details of the basic course proposed by SCINTILLA, since this is the initial/preparatory stage of the whole educational programme for educators in homebound training for SW.

### ***The basic training course***

A blended approach was adopted for the course (almost exclusively online activity, with three classroom sessions for seminars with experts), which lasted 6 weeks and involved 10 trainers from Isforcoop, one of the EFPs of the Liguria Region. The macro-

objectives of the course were to acquire (a) skills for the planning and management of online training for young homebound subjects, and (b) knowledge on SW and on how to propose it to companies for the work inclusion of seriously disabled individuals.

The following tables describe the objectives in detail, as well as the associated training activities.

The objectives of online training for homebound subjects (Table I) were pursued using project-based training activities, as well as exercises based on some web technologies and services. After explanation of a particular approach to instructional design for the online training of homebound subjects worked out by ITD-CNR, participants were asked to apply it to the planning of an online training course for their homebound students. The goal of this training course was acquisition of the skills requested by the companies who had offered disadvantaged subjects work inclusion in SW mode.

TABLE I. OBJECTIVES OF SECTION I OF THE BASIC COURSE

<b>Section I - Online Training for Homebound Subjects</b>
<b><i>Module 1 – Methodologies of Instructional Design</i></b>
<ul style="list-style-type: none"> <li>• Learning and being able to apply a specific instructional design (ID) methodology for web-based education and training</li> <li>• Understanding the key elements on which to base formative and summative assessment in web-based education and training</li> <li>• Getting to know the roles and functions of the online tutor</li> </ul>
<b><i>Module 2 - Technologies for Online Training</i></b>
<ul style="list-style-type: none"> <li>• Getting to know the basic functions of a Learning Management System (LMS)</li> <li>• Getting to know some specific web resources for individual and/or collaborative development of artefacts (e.g. wikis, Google Drive, Skype, etc.) and for course management (e.g. Moodle)</li> </ul>
<b><i>Module 3 - E-content, e-tivities and organisation of virtual classrooms</i></b>
<ul style="list-style-type: none"> <li>• Learning how to plan simple e-contents and e-tivities</li> <li>• Learning how to set up virtual classrooms for the management of web-based courses for disadvantaged subjects</li> </ul>

The objectives of the second section of the course (Table II) were pursued through (a) the study of tele-working and SW materials, (b) a collaborative, role-playing activity, and (c) the collaborative creation of a 10-point plan for promotion of SW in the company.

Role-play, conducted in pairs in videoconferencing, consisted of simulating a dialogue between the trainer/mediator and the company representative for the purpose of work inclusion of the trainer's student in SW mode. The trainer/mediator had the task of persuading the representative to accept the working solution best fitted to the candidate's

profile; while the company representative had to ascertain the compatibility of the solution offered with the company's organisation and production processes.

TABLE II. OBJECTIVES OF SECTION II OF THE BASIC COURSE

<b>Section II - Smart Work for Homebound Subjects</b>
<b><i>Module 4 - Tele-working</i></b>
<ul style="list-style-type: none"> <li>• Acquiring an overall view of the concept of tele-working and its effects</li> <li>• Getting to know the tele-working context from the normative, cultural and organisational points of view</li> <li>• Identifying the tele-workable professions and tasks</li> </ul>
<b><i>Module 5 - Smart Work for special needs</i></b>
<ul style="list-style-type: none"> <li>• Understanding the social dimension of disability and getting to know the theoretical approaches to intervention</li> <li>• Getting to know the problems related to work inclusion interventions and the strategies for managing them</li> <li>• Getting to know the ways of organising a work-space in one's own home</li> <li>• Getting to know the main technological aids for the different disabilities</li> <li>• Acquiring theoretical and methodological approaches to accompany the subject's acquisition of a working identity in disadvantaged conditions</li> <li>• Learning how to plan a work inclusion process in Smart Work mode</li> </ul>

#### **THE EVALUATION MODEL FOR THE TRAINING PROGRAMME**

As specified earlier, the evaluation model for the whole training programme was inspired by Kirkpatrick's four levels: reaction, learning, behaviour, result. In our proposal, these levels were interpreted as follows.

##### ***Satisfaction and ideas for application (reaction)***

This consists of measuring the degree of satisfaction of participants in a specific training course, as well as the ideas for application that this course suggests to them.

Although the first level is important, a favourable reaction on the part of the participants does not ensure learning of the contents and/or skills which are the training goals. A training intervention might in fact seem very useful and enjoyable to its users but might be difficult to apply to their working context on a practical level.

### ***Learning of the course contents (learning)***

This addresses what the participant has learnt during the course; to establish this, tests, practical activities (project development), role-plays, simulations and other assessment strategies can be used.

However, positive results at this level still do not guarantee that participants are able to correctly apply what they have learnt. The literature abounds in examples of the gap which often exists between “knowing” and “knowing how to do” [15].

### ***Practical application of what has been learnt (behaviour)***

There are several methods for follow-up analysis [16][17], that is to say ascertaining how participants transfer the lessons of their training course into their professional context. One of these is direct observation of how newly-trained subjects apply the knowledge they have learnt and/or the skills they have acquired.

However, even if the assessment of the capacity for practical application of acquired knowledge is positive, there is still no guarantee that this will be translated into an equally positive impact of the training programme in the newly-trained subjects’ and/or their stakeholders’ mother organisation.

### ***Impact on the organisation (result)***

The impact may be measured at various levels: from the economic level to the level of satisfaction of the client (a company, an institution, a training body, etc.), to the level of improvement of the production cycle etc.

In the model proposed here, “organisation” refers to at least two bodies: (a) the institution to which the newly-trained subjects belong, i.e. the EFP, and (b) its stakeholders, i.e. the companies/firms with which it is in contact for the work inclusion of its students (in our case, seriously-disabled ones).

Undoubtedly, measurement of the impact on the organisation is not only the level which is the most complex to evaluate, but also the one which needs longer observation times in order to achieve reliable results.

In this regard, Fig. 2 shows the time windows which are deemed necessary for formulating the evaluation associated with the various levels.



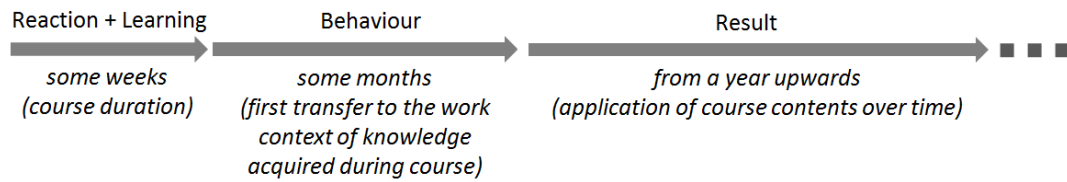


Fig. 2. Estimation of the time windows required for formulation of the evaluation associated with the various levels.

## APPLICATION OF THE PROPOSED MODEL TO THE TRAINING PROGRAMME FOR SCINTILLA EDUCATORS

A description follows of the application of the evaluation model to the training programme created for EFP trainers by the SCINTILLA project. Fig. 3 shows the stages at which the measurements were made for the four levels used for the assessment of the whole training programme.

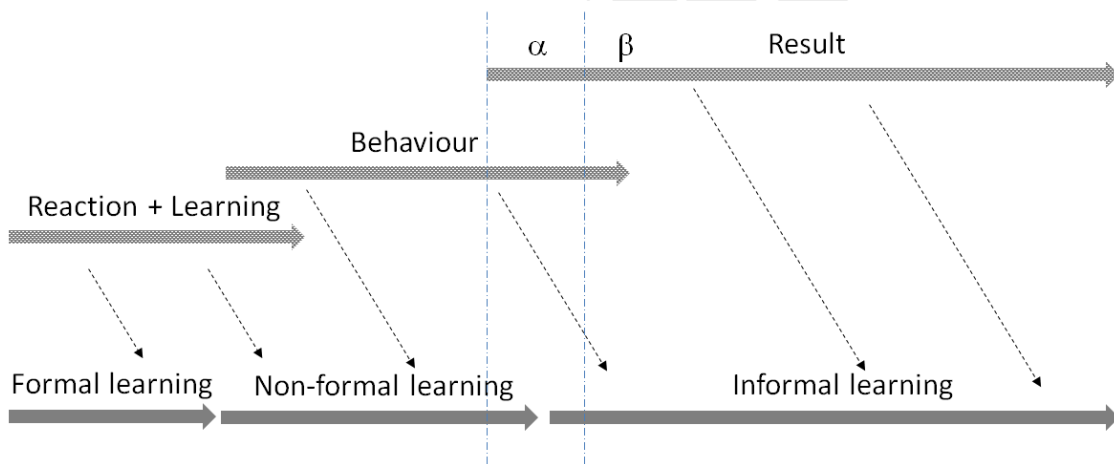


Fig. 3. The stages for the measurements for the four levels of the evaluation model<sup>2</sup>.

### *Users' reaction to/appreciation of the basic training course*

The measurements for the first level were made at the end of the basic training course (formal stage). Table III shows the indicators for the evaluation related to Level I and the methods used for their measurement.

2. The meaning of the letters  $\alpha$  and  $\beta$  will be explained below.

TABLE III – INDICATORS AND METHODS OF MEASUREMENT FOR LEVEL I (REACTION)

<b>Reaction</b>	
<i>Methods of measurement</i>	Discussion during final course session
<i>Indicators</i>	<ol style="list-style-type: none"> <li>1. Correspondence between expected topics and those actually proposed</li> <li>2. Perceived usefulness of the exercises and appropriateness for trainers' professional activity</li> <li>3. Perceived operational usefulness of technologies proposed as tools for professional activity</li> <li>4. Perceived quality and usefulness of didactic material prepared specially for the course</li> </ol>

### ***Learning the online course contents***

Assessment of the understanding of the educational contents (planning and management of online courses; web technologies and resources; features of SW and organisational methods) was spread over the whole period of the basic course (formal stage) and was partly continued during the practical application of the knowledge acquired to the first experience of online management of professional training activities (non-formal stage, since it was supported in backstage and sometimes redirected by ITD-CNR staff). For the skills related to online training, the assessment:

- was orientated, in the formal stage, towards measurement of the ability to apply an ID methodology to the planning of an online training activity;
- was extended, in the non-formal stage, to newly-trained subjects' ability to act as online tutors for their students.

On the other hand, for SW-related skills, assessment of learning was based mainly on observation of the course participants' argumentative skills during the role-play simulating the interaction between the trainer and the company representative. Table IV shows the indicators for evaluation at Level II and the methods used for their measurement.

### ***Skill in applying what has been learnt in the online course***

This is the level in which the educators' ability to put their knowledge into practice was assessed. They in fact did this in a not wholly independent way (this is why it is defined as non-formal learning), in the sense that an ITD-CNR tutor/expert followed them and sometimes guided them backstage during their first experiences, both as managers of their disabled students' online training and as direct interlocutors with the

company into which these students were to be inserted. The evaluation established for this level was extended into the initial stage of interaction with the company, which aimed both at creating the best conditions for young homebound subjects' work inclusion in SW mode, and at defining the tasks they were to undertake.

TABLE IV. INDICATORS AND METHODS OF MEASUREMENT RELATED TO LEVEL II (LEARNING)

<b>Learning</b>	
<i>Methods of measurement</i>	Analysis of the results of students' course activities
<i>a) Indicators related to learning of ID approaches</i>	1. Pertinence of plans for online training activities handed in by participants to the ID models proposed in the course
<i>b) Indicators related to use of web technologies and resources</i>	2. Correspondence of Moodle learning spaces structured by participants with the indications in the scripts for the online activities 3. Correspondence between the documents created with Google Drive and PBWorks with the specific requirements of the exercises 4. Level of correctness of the exercises centred on videoconferencing tools
<i>c) Indicators related to ability to mediate with the company</i>	5. Level of coherence of the elements examined during a role-play simulating a case of work inclusion through smart working, i.e.: <ul style="list-style-type: none"> <li>• context mapping (disabled subject to be included, company situation etc.);</li> <li>• professional (and SW) solution;</li> <li>• work task can be undertaken in SW mode;</li> <li>• methods of accompaniment to SW and of interaction with the company;</li> <li>• technological setting of tele-work station.</li> </ul> 6. Appropriateness of the parts contributed by the single participants for a "Ten-point plan for the promotion of SW in organisations", required as a final output for one of the course activities

Table V shows the indicators for the evaluation of Level III, together with the methods used for measuring them.

TABLE V. INDICATORS AND MEASUREMENT METHODS FOR  
LEVEL III (BEHAVIOUR)

<b>Behaviour</b>	
<i>Methods of measurement</i>	Observation of the trainer's operating methods in a real case, during (a) planning and application of an online training activity and (b) accompaniment of the individual candidate in their work inclusion
<i>a) Indicators related to the application of ID approaches and online tutor functions to a real case</i>	<ol style="list-style-type: none"> <li>1. Application of the approach to planning online training activities learnt during the course</li> <li>2. Preparation of the scripts of the online activities according to the scheme proposed in the course</li> <li>3. Choosing the most adequate technological tools for the planned online activities</li> <li>4. Conduction of online tutoring, i.e. carrying out/support of planned online activities</li> </ol>
<i>b) Indicators related to mediation/coordination with the company</i>	<ol style="list-style-type: none"> <li>5. Analysis of context and actors</li> <li>6. Suitability of chosen task for the disabled subject</li> <li>7. SW solution suitable for the candidate</li> <li>8. Strategies of communication among company, candidate and trainer</li> </ol>

#### ***Effects of the training programme on the organisation (EFP, company)***

As specified earlier, in our case “organisation” is used to indicate both the institution to which the trainers belong (the EFP) and the companies/firms with which it is in contact for the purposes of work inclusion of a young disabled subject.

The real effects on the organisation should in fact be evaluated only when the inclusion process is in the stabilisation stage.

In the case of SCINTILLA, it is the moment at which the trainers begin to act independently (i.e. without the assistance of the institution which has trained them - in our case the ITD-CNR), both in training their students online and in negotiating their possible inclusion with the company in SW mode.

It is the stage where the trainers' learning continues to develop mainly in the informal dimension, i.e. learning-by-doing and incidentally acquiring knowledge during the periodical search for new solutions in (a) planning and carrying out online training courses, and (b) building bridges between their students and the companies willing to employ them.

Although the real effects are evaluable only over the medium/long period [18], some form of impact on the organisation can actually be observed even in the short term (stage  $\alpha$  of Fig. 4).

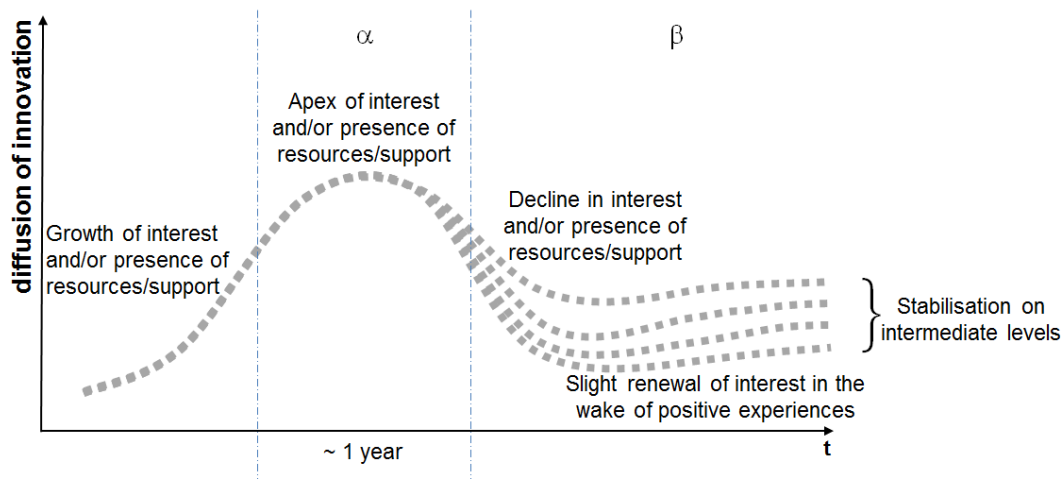


Fig. 4. Diffusion of the innovation and impact on the organization.

This is the stage in which the long wave of interest produced by the previous (formal and non-formal) stages of the training programme, including the scaffolding of the institution which has been responsible for the overall training programme, can still be perceived. The result is that in phase  $\alpha$  significant signals can already be registered in terms of:

- effects within the EFP, e.g. extension of the application of what has been learnt to the planning and creation of other courses (blended or wholly online) not necessarily targeted at disabled students;
- effects for the company/firm, e.g. acceleration of the inclusion of the disabled person in the production chain; better use of online communication to maintain contacts between the company and the worker during the activities in SW mode; extension of the SW approach to management of the work of the rest of the staff.

However, if we wish to talk about measurement of the real/stable impact, this must necessarily be carried out in the medium/long term (stage  $\beta$ ), i.e. when objective considerations can be made, at a sufficiently distant time from the training course, about how stably rooted the effects of the training have become inside the organisation (in direct, indirect and unexpected terms). The extent of the rooting is represented in Fig. 4 by an upward or downward trend in the right part of the curve (stabilisation on intermediate levels). Table VI shows the reference indicators for Level IV evaluation, together with the methods used for their measurement. These indicators can be used for both the stages ( $\alpha, \beta$ ) associated with the “result” level.

TABLE VI. INDICATORS AND MEASUREMENT METHODS FOR LEVEL IV (RESULT)

<b>Result</b>	
<i>Methods of measurement</i>	Measurement by means of informal talk and asynchronous interview
<i>a) Indicators related to impact on EFP</i>	<ol style="list-style-type: none"> <li>1. Application of the methods and tools of the basic training course to similar cases (training and work inclusion of seriously disabled subjects)</li> <li>2. Extension of the application of the methods and tools studied in the basic training course to the creation of new courses (blended or wholly distance), not necessarily targeted at disadvantaged users</li> <li>3. Use by the EFP of SW approaches in internal work organisation (integration of ICT into internal communication processes, use of clouding for collaborative work, remodulation of work)</li> </ol>
<i>b) Indicators related to impact on company/firm</i>	<ol style="list-style-type: none"> <li>4. Reduction of times for inclusion of disabled worker</li> <li>5. Improvement in the use of online communication to maintain contact between company and worker during activities in SW mode</li> <li>6. Use of SW for insertion of other disadvantaged cases</li> <li>7. Extension of SW approach to other cases not necessarily linked to a disadvantaged situation and more orientated towards the internal organisation of work and its optimisation (integration of ICT into internal communication processes, use of clouding for collaborative work, remodulation of work)</li> <li>8. Consideration of Smart Work potential in company's future planning</li> </ol>
<i>c) Indicators related to indirect effects of the training course</i>	<ol style="list-style-type: none"> <li>9. Request for lectures about inclusion and/or SW in conferences and workshops</li> <li>10. Presence of institutional competitions for distance working, inspired by the experimentation carried out in SCINTILLA</li> <li>11. Attention to SW potential and online training by institutional and non-institutional organisations belonging to the work inclusion network for disadvantaged subjects</li> </ol>

## CONCLUSIONS

The four levels proposed by Kirkpatrick for the evaluation of a training programme originate from company training schemes where they find fertile ground for their complete applicability. There are two reasons for this:

- the times required for the whole evaluation process are generally shorter, for example in the fourth and most complex of the levels (result), whose observation window can sometimes be reduced to just a few months after the completion of the whole company staff training course (e.g. introduction of a new operational procedure and subsequent assessment of the effects on the organisation);
- there is a strong need to be sure that what has been observed in terms of positive modifications in organisational practice can really be ascribed to the training

programme. This is in fact the necessary condition in order to proceed to the estimation of the corresponding ROI (Return On Investment), expressed mainly in tangible terms and to a lesser extent in intangible ones [19].

In educating the educators, this type of measurement is decidedly less clear-cut. In evaluating what type of impact a training course has had on educators (e.g. school teachers, EFP trainers etc.), it should be able to detect its impact on the didactic practices of the educators' mother institution and indicate how these practices have in their turn led to improvements in students' learning, etc.

The result is that in evaluating a training course for educators, almost always only the first and second levels of Kirkpatrick's model are taken into consideration., much more rarely the third.

For the reasons we have explained above, the fourth level is almost never considered, both because of the medium-long time window which is required in order to evaluate it effectively, and because the measured/measurable effects in these cases are almost exclusively intangible (an economic evaluation of them is indeed very difficult, if not impossible)[20].

In this article we have tried instead to propose an evaluation model for the training of trainers which covers all four of Kirkpatrick's levels, using the intangible returns of investment as the key of interpretation for the fourth one. Although these returns are not economically quantifiable, they are retained in fact to be essential for a qualitative evaluation of a training programme for trainers, from both the pedagogical and the organisational points of view.

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