The Development of ICT Tools for E-Inclusion Qualities

Work in Progress

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Abstract. With the diversity and increasing use of different information and communication technologies (ICT) in the educational sector, new pedagogic approaches are also being introduced and have had a major impact on the educational sector, focusing on different perspective including improved educational methods and in both schools and homes, information and communication technologies (ICT) are widely seen as enhancing learning, fulfilling their rapid diffusion and acceptance throughout developed societies. But the need to utilize ICT tools to support and guide educators in finding the right support for students with special individual needs is still a challenge, investigating different challenges that are presented to teachers in their working environment is an ongoing matter. One of these challenges that teacher face frequently is creating an inclusive environment. An "inclusive education" is a process of strengthening the capacity of the education system to reach out to all learners involved. It changes the education in content, approaches, structures and strategies, with a common vision that covers all children of the appropriate age range. Inclusion is thus seen as a process of addressing and responding to the diversity of needs of all children. Therefore an inclusive education system can only be created if schools become more inclusive, in other words, if they become better at educating all children in their communities with their individual needs. Therefore, creative forms of communication should be encouraged to promote personalized care, hence the focuses of this research is to investigate the use of data process flow map with the aim to guide the teacher towards an inclusive way of thinking.

Keywords: Information and communication technologies · Inclusion
Education system

1 Introduction

The utilization of ICT tolls has been investigated and introduced in many studies in different context. The potential of social inclusion and exclusion that technology can offer, and the way in which technology can facilitated to access information sources, learning opportunities and personal agencies can be investigated [1]. The World Declaration on Education for All, adopted in Jomtien, Thailand (1990) [2], sets out an overall

vision: universalizing access to education for all children, youth and adults, and promoting equity. This means being proactive in identifying the barriers that many encounter in accessing educational opportunities and identifying the resources needed to overcome those barriers [2]. Flexible teaching-learning methodologies necessitate shifting away from long theoretical, pre-service-based teacher training to continuous in-service development of teachers [2]. A survey regarding ICT in education was commissioned in 2011 by the European Commission Directorate General Communications Networks, Content and Technology to benchmark access, use of and attitudes to ICT in schools in the EU27, Croatia, Iceland, Norway and Turkey, the conducted survey investigating the use of ICT in education. More than 70% of teachers surveyed at all grades expressed a positive or very positive opinion about the relevance and positive impact of ICT to support different students' learning processes (working collectively, autonomously, practicing, etc.) and objectives (motivation transversal skills, higher order thinking skills, etc.) [3]. The possibility of people participating in the Information and Knowledge Societies is dependent on the availability and affordability of ICTs and relevance of contents and services, but also on their accessibility: 'users must be able to perceive, understand and act upon ICT interfaces' [3].

The objective of this study is to investigate the utilization of Information and Communication Technologies (ICT) in creating a digitalized process that can assist educators in finding the right support for pupils with special individual needs, were generalized teaching methods cannot be applied and student needs are challenging to recognize. ICT is a particularly valuable tool for children with special needs and can improve their quality of life, reducing social inclusion and increasing participation.

The aim of the platform is to guide the teacher towards an inclusive way of thinking, creating a balance between three main factors, which are the student, the environment and associated activities, resulting in full participation which is the main concept for this research project to create an inclusive environment for every child with special educational needs, creating a unified model for inclusion.

2   Background and Method

This study is part of a European project where the objective of the research is to utilize the Index of inclusion as a mind map, several associates are involved, including a Municipality representing Sweden as strategic partnership, together with municipalities in Germany and Iceland. The project involves different education schools (pupils aged 8–18), primary schools (pupils aged 5–12) and secondary schools (pupils aged 11–18). The average age of pupils involved in the project is 9.5 years in the primary school and 14.5 in the secondary. The overall project focus is to learn from each other by sharing experiences of the inclusion work carried out in each country, hence teachers act as a gateway and their skills development and curriculum resources need increased support.

The fact that the drive towards equity in education through the support of accessible ICT is a main concept hence is the main research goal in this project. The focus of this paper, is to create an ICT tool "Digi-Flow" that can assist educators to find the right support for students with special educational needs. The goal is to create an ICT tool

"Digi-Flow" in such a way that can help determine what is best for children with special needs. It is important to focus on creating an optimum learning environment so that all children can learn and achieve their individual potential. Therefor the research approach for this project was done via a collaborative teaching environment working with different educators with different pedagogic backgrounds that emerged during which proved to be a positive side effect of the collaboration. The process of exchanging information between groups, increases knowledge of the study group, and this experience, by helping to widen perspectives and provide accurate knowledge about the study group involved.

During this process the term "full participation" was identified during this research as a main pedagogic goal to create inclusion qualities, creating a unified model for Inclusion. In order to achieve this three main factors where identified, which are the student, the environment and associated activities.

By using a Scrum-agile approach it helped identify the main users of the tool in addition to different usability requirements and characteristics which lead to creating an initial prototype, this approach also helped to verify and identify new and changed requirements. During several different sprints were able to identify several main concepts used to create a unified model for inclusion between all associated partners, which helped create the main functional requirements of the ICT tool "Digi-Flow".

With the concept of "Full participation" as core requirement, the objective of the ICT tool is to help the teacher investigate and determine the different factors to assess and create a statically overview of the main factor for an unbalance environment. Helping the teacher determine the needed actions and resources, creating an "Action plan" clarifying how to achieve balance and therefore achieving "Full participation". As shown in Fig. 1.
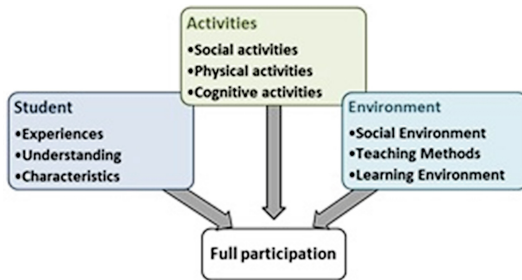

Fig. 1. Dimentions of full participation.

3   Result and Discussion

Several fundamental outcomes have been achieved during the early stages of this research, including a full pedagogical assessment for the Index of inclusion, benchmarking the concept of "inclusion" between all European partners, creating a unified model that can be adapted to all countries. The development of the ICT tool "Digi-Flow" was influenced by gathering different reflections and information which was collected via different investigations and surveys that where performed, giving a clearer objective for the tool and the data needed to be included.

Since the ICT platform was created with partnerships from three different European countries it was important to understand different national requirements and regulations therefore three data clusters were considered:

1. Country legal, regulatory and programmatic commitments.
2. Country capacity to implement and apply the introduced solution.
3. Country actual results for children with special needs.

The objective of this research is to create an effective platform which can help determine what is best for children with special needs, therefore the most important element is to create a logical structure of questions. The designed platform will utilize the Index of inclusion as a mind map in a unified form between all three countries, and as a design process following the Inclusion stages- process flow for the digital tool. In a previous study the dimensions of inclusion where identified and categorized into three main categories [4], which are:

1. Equivalence: the school's capability to see/recognize and understand the pupils preconditions and needs.
2. Accessibility: the school's capability to adapt teaching, localities and social community from a diversity of needs.
3. Participation: the school's capability to stimulate pupils to 'take part'; learning to be lead, to lead oneself and learning to lead others.

To insure quality and effectiveness an auditing process was used during the development of the ICT tool, the main objective of this process was to confirm the different data collected and to help verify the different platform requirements and specifications during developed. Creating a more efficient and effective environment for all partners included in the project hence reduce and forms of redundancy in both the development method and data collected. The behavior of this process was integrated within the development method used, therefore had an incremental nature. As shown in Fig. 2, the audit process consist of several main stages and sub stages which are:

1. Planning: The aim of this phase was to help create a focus point, selecting specific features from a list of different requirement definitions, and to identify which requirement set to verify and develop further into specifications. Sub stages included:
   (a) Select priority from list
   (b) Review objectives
   (c) Set standard
2. Data Collection: During this phase the defined requirement sets where expressed in different data forms, reviewing the objective of the different data needed to be included and why. This was achieved via three sub stages:
   (a) Design audit
   (b) Collect data
   (c) Analyze data
3. Reporting: The objective of this phase was to verify and validate requirements that where translated into specification via prototyping via collecting feedback from all partners and participants.

4. Implementation and Monitoring: All feedback gathered in the previous stage was assessed and evaluated, redefining requirements and introducing changes when needed, and therefore reviewing initial requirement standard and creating action plans.
5. Review and Re-audit: The aim of this phase was to review all decision making and create additional plans.
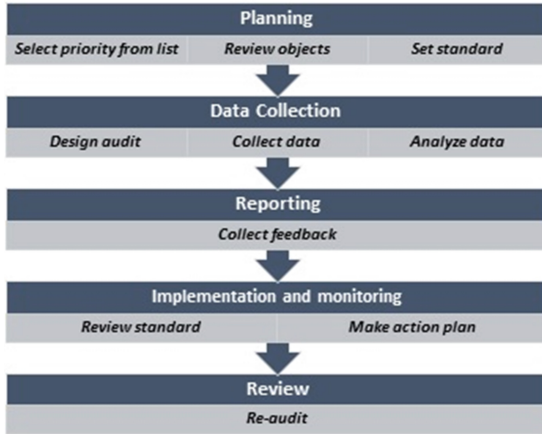
Fig. 2. Audit process
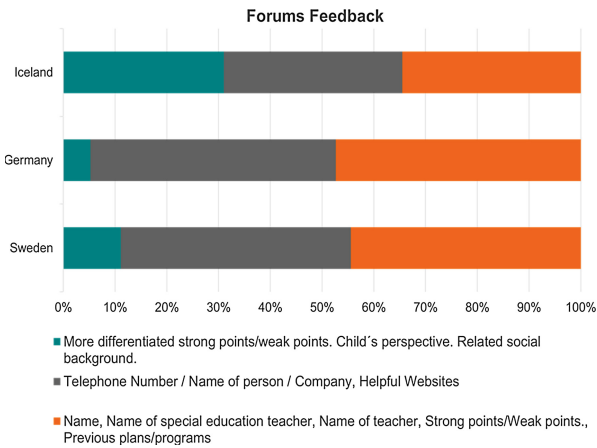
Fig. 3. Related information

Early results show that the need for such as tool has been confirmed, but also that the potential users for the tool can vary. Using this process also helped identify which type of data can and must be included in the ICT platform and why, such data included

information regarding the child´s perspective and related social background. As shown in Fig. 3, different ideas where gathered and analyzed to help create the data sets required for the ICT tool "Digi-Flow" [4].

The results also show different user groups, indicating that the user group which found most need for such a platform are special educators, whom work directly with children with special needs on different levels. As shown in Fig. 4.
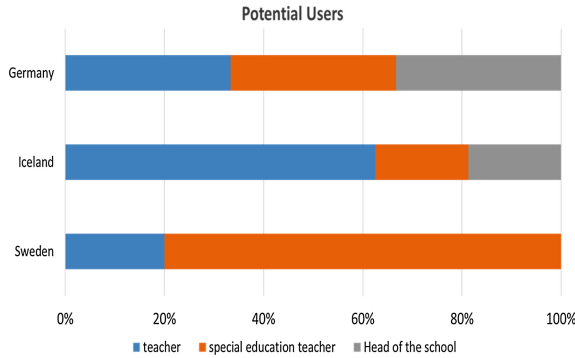
Potential Users

Fig. 4. Potential users

The study also emphasizes that the tool can be utilized as a platform to improve communication not just for the different educators working with children with special needs but also as a platform for communication between the school and parents.

The developed platform consists of different questions which are divided into categories, weights and bases. The categories are used as a factors to link resources and the bases are to filter the questions. Base in this project means two things.

1. Base-Questions (or parent-questions) can have questions depend on them, meaning sub-questions (or children-questions)
2. Base-Questions act's as the filtering process.

All questions in the system where identified, verified and validated via different survey to confirm they cover the cornerstones to attest "full participation", see Figs. 5 and 6.
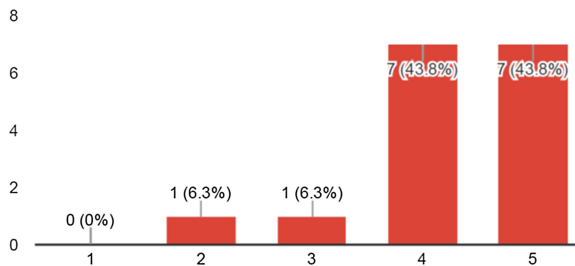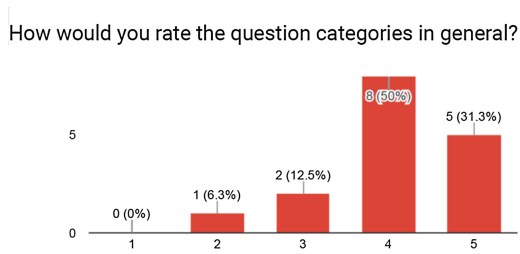

Fig. 5. Survey to validated used questions

How would you rate the question categories in general?

Fig. 6. Survey to validated and verify the categories used.

As the platform fetches a question it examines if it's a base-question. If it is, depending on the answer provided, it will identify any sub-questions linked to it. The 'weights' in this ICT platform are used to determine the importance of the questions. Weights are stored in every answers and effect the questions in a 'positive' or 'negative' way. Every question and resources are linked to a category. It maintains good structure and simplifies understanding and goal to what the objective of the question is. The main categories of full participation are displayed with a numerical representation of their relevancy to the current evaluation. The results obtained from different user groups utilizing the tool includes, a main resource page, which contains links and information of persons and country organizations that can be contacted. Additional studies and prototyping is in progress as part of this study and are part of future results verifying the advantages of ICT tools in this context. To what extent the ICT tool is spread will be measured in long-term perspectives and assessed accordingly.

4   Conclusion

As a conclusion, using ICT tools to link schools and different recourses can deliver substantial educational benefits, for both teachers and children with special needs. By assisting teacher in the process towards an inclusive environment helps create a sustainable and effective platform which can help determine what is best for the students and helping the teacher determine the needed actions and link resources to relevant information.

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