Educational Media Technology and its Inclusive Potential

Findings from a multidisciplinary workshop covering recent approaches in informal, formal and continuous education

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Abstract: The workshop investigates the inclusive potential of educational media technology, based upon a review of recent approaches in informal, formal and continuous education. It is intended to present approaches at the interface between technology enhanced learning and teaching and the ongoing development of computer sciences and respective technological approaches. Indeed, respective papers reflect special needs of learners in any sector of education from informal to formal learning and as well-situated education in the context of the home or workplace. Most recently, the corona pandemic did lead to a strong need for including even average population without any special need into formal education. Reflecting that development, the focus of the workshop shall be on both, special needs and special conditions addressing requirements of TEL / TET. Accordingly, special attention is given to international, even global comparative approaches of how educational media technology is applied in an inclusive way covering both, an individual psycho-physiological as well as a socio-cultural dimension. Subsequently it can be concluded that authors have been able to identify diverse perspectives of inclusiveness when it comes to the adoption of educational media technology.

Keywords: TEL / TET, inclusion, educational media technology, informal, formal and continuous education.

1   Introduction

Not only with the recent corona pandemic the inclusive potential of digital media has been considered as innovative in the light of supporting accessibility and heterogeneity in any educational context. Formal education, namely general and higher education, does have a further educational mandate and is encouraged to submit innovative offers for social participation. Teaching at school and university - so that it is accessible to everyone - must be more clearly oriented than before to the individually varied learning skills and other characteristics of the individual. In particular, digitally supported forms of micro learning are taught in open offers. In addition, databased approaches to learning behaviour open up diverse and, above all, novel entries for teaching staff – cf. learning analytics and tailored training [KK05]. It is suggested that the implementation of digital technologies in the

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educational system provides considerable benefits for inclusive education by helping pedagogues to exempt from routine work and facilitating the fulfilment of educational tasks for children with disabilities [AAB20]. Yet to allow such shift digitalization and the use of artificial intelligence must be mastered, leading to new teaching concepts [KWI19]. Thus, some attention is given to modularized online-based formats for the individual further development of teaching staff are to be considered in order to enable them for inclusive educational practice [AAB20, OSD19].

While recent research developments, for example, deal with the user experience and the usability evaluation when using personalized adaptive e-learning system [HTK20] as well as the function of peer groups in response to digital exclusion of older adults [BK19] such did and does not always systematically address the domain of media technology and its inclusive potential. Moreover, developments either are often driven by technological opportunities or selected conditions of a specific case. For example, most of the research and development projects of the authors include a sub-project dealing with user experience and evaluation of effects caused on the target audience (for example pupils using a new learning software with restricted access to schooling). Yet with the wide distribution of smart devices and its combination with new digital assistants and augmented technologies, the landscape of technical artefacts has become much more diverse, powerful and ubiquitous [MSZ19]. Digital technology with a fine inclusive potential is everywhere [ZML17] and did start to coin how we implement it with new patterns of automated, sometimes even AI-driven adaptation to any user's needs [KWI19], not only in educational settings.

However, does such mean that we have to consider inclusive practice anew in the light of the digital transformation [MK17]? Taking this assumption into mind the workshop intended to review recent approaches in formal and continuous education, which apply digital technologies for inclusive practices. Resultantly it was expected that both, theoretical and case based studies might contribute to a wider picture of the state of the art, providing evidence of effective measures and dysfunctional approaches as well. Conceptually the workshop does focus on educational technology studies as interface between computer science and education science, ideally located in order to detect and reflect the potential application toward inclusive practices in an inspiring way.

2   Recent conditions of educational media technology and inclusion

2.1   The context of the UNCRPD

Educational staff not only at the university must recognize how to deal with heterogeneous learning groups and design individualized educational paths, as demanded by the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) - which currently seems to be very far from the implemented educational practice. Rather, the practical situation shows that educational professionals like teachers are overwhelmed in

many cases when learners with learning difficulties, different mother tongues, social difficulties or other inclusion obstacles attend seminar groups or school classes. Often there is an increased need for supervision or individually specific forms of care required, which is not always and not necessarily delivered by the education professionals, but as well by peers, family and administrators. Under the given analogue teaching conditions[4], the opportunity of meeting those demands seems to be very limited.

2.2   Participation for everyone through an equal education process all over the life span in the light of educational technology

The teaching staff working at the university as well as the newly trained pedagogues (mostly to become teachers at school but also other educational institutions) will enable or make it impossible for everyone to participate in the educational process in the future. The prerequisite for this is how educational staff is sensitized to the condition of people with disabilities (disabilities stands for special needs in a very wide sense) and is able to recognize and largely dismantle communication and knowledge barriers. Ideally, educational processes are actively supported by people with inclusion barriers, such as in particular disabilities, but also migration biography etc., and lead to their comprehensive participation in social life.

In Germany, the number of smartphone users is 57 million, with remarkable annual growth rates [BI18]. However, this supposedly broad social acceptance is deceptive and the use of digital media seems to be an age-specific phenomenon. While coverage with smartphones in the 14 to 49 year old age group is over 95 percent [ibid], only 41 percent of population aged 65 and over use a smartphone [LMT17]. The usage behaviour decreases with increasing age [BA19] and in this respect the question inevitably arises, what causes the given age-related digital divide?

For implementation in education of any sector (including senior citizens), however, it is not only necessary to raise the awareness of education professionals, foremost teachers, docents and lecturers, but also to sensitize and update the administrative staff, who structure processes such as recognition processes or exams. For the organization of courses, all these actors must also have basic knowledge about the design of teaching-learning processes at the university, in detail regarding e.g. achieve the design of open (inclusion-supporting) curricular structures and their media implementation [cf. Müller & Gottschalk in this volume].

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[4] It is noteworthy to mention that this text has been first drafted just before the pandemic reached Europe in March 2020 and now corrected for final submission in November 2020. Obviously, our perception of 'regular' teaching conditions has been affected heavily – the new normal is analogue anymore.

3   Developing comparative perspectives in between computer sciences and education sciences over time

3.1   Previous workshops

As part of DelFI 2013, the workshop "Inclusive E-Learning" was successfully carried out for a first time. Contributions covered a wide area from university infrastructure to personalized content, with a focus on general inclusive offers and concrete implementations for learners with disabilities. The topic of the workshop fit well into the profile of DelFI 2014, which dealt with current approaches, new scenarios and developments in the area of accessible teaching / learning content as well as studies on accessibility and acceptance of teaching / learning content.

In recent years, the research was rather diverse but not fully covered by DelFI. As well, the ECTEL did have a respective focus in 2013 only when the functional diversity and users with special needs had been addressed explicitly. In 2020, with the presented workshop volume, this focus is to be continued with an international (if possible comparative) and clearer interdisciplinary focus. Organizers were looking for scientific contributions as well as best practice examples and case studies. Those cover (without being limited) the following topics:

− Novel mechanisms for learning target and group-oriented adaptation of teaching / learning content;
− Innovative developments of ubiquitous information technical means for knowledge related purposes;
− Developments and studies on learning methods for physically or mentally impaired learners / teachers;
− Ethical and epistemological considerations which lead to an improved understanding of recent developments at the interface between computer sciences and education science
− Intercultural comparative research elaborating the meaning of educational cultures for inclusive or exclusive practices in adopting educational media technologies.

3.2   Topics of the Workshop

In order to investigate how to complete educational activity without barriers by adopting educational media technology in an appropriate way the field was split into different perspectives to cover main dimensions in a more systematic way. Even though this does not have the character of a generic theoretical approach, there were four main topics for the workshop:

a) The physiological dimension of educational media technology: special needs from a medical perspective

Surprisingly both the keynotes deal with rather medial aspects for accessibility and the related inclusive potential of educational media technology. First the Barriers in E-Learning for People with a Sensory Disability are discussed (the keynote by Gerhard Weber of Technische Universität Dresden), before there is a focus on personalized Intelligent Intervention and Precise Evaluation for Children with Autism Spectrum Disorder (the keynote by Jingying Chen of Central China Normal University).

b)   The educational dimension: how learning objects and educational material function

Analog learning materials and situations can mean the exclusion of certain people due to the location, the media use, etc. Examples include physical disabilities, cultural differences, individual learning styles and personality traits or seniors. Due to its location-independent, predominantly time-independent properties and digital, adaptable materials, e learning enables many disadvantaged groups to access learning content. At the same time, the consideration of accessibility guidelines also has a positive effect on the usability of systems for users without restrictions. However, the increasing multimedia and distribution of dynamic content and mobile devices can also create new barriers. For example, participating in a synchronous session of a virtual classroom is difficult for a blind learner. Due to factors such as the orientation between different windows, the parallelism of activities and the use of multimedia content. Ubiquitous computing as well as open educational resource policies eventually open up improved access – and demand for renewed practices of inclusion

c)   The social dimension: how collaborative activity is enabled of disabled

Even though TEL / TET could primarily be considered, a form of HCI does not meet the conditions of an Educational media technology. When it comes to an effective educational activity the inclusive potential is especially linked the communicative dimension of the endeavour and related collaborative activity. Indeed, smart devices and permeant online connectedness created new forms of social collaboration – even in times of social distancing. Yet does education always need a teacher or is the collaborative activity with any other individual – either learner or expert – enabled and functional as well? Does exclusive (!) practice start when classrooms are hidden behind an institutional (fire-) wall and exclude independent access to different objects, materials or communications?

d)   The intercultural dimension: what we may conclude from comparative approaches

While computer sciences are per se a global endeavour education is of the driven and framed by national or even local (state defined) pattern of activity. The comparison of approaches – for example based on data collected in China versus Germany – shall be presented in order to allow useful conclusions at the interface of global technology and local education approaches. It is expected, that teaching with digital media becomes a major approach in any educational sector and culture. Still, appropriate competencies of

the staff are an entry condition in order to allow inclusive practices. Does educational or informational culture need to differ between digital and analogue inclusion? Alternatively, does either way mean the exclusion of a certain target audience? Of course, the intercultural dimension is linked to the special needs of educational audiences that meet the demands of diversity by new approaches of (virtual) openness, using formats such as open schools of massive open online courses, or, again open educational resources.

3.3   Structure of the Workshop

The workshop "Educational media technology and its inclusive potential" was embedded into one-day event together with the workshop "Digitally supported inclusive practices in education and training". This it became possible to present findings in a multidisciplinary way when the workshop did cover recent approaches in informal, formal and continuous education over half a day. Because a part of the audience, including one of the two keynotes, came from Asia, there was a global outreach, which lead to comparative character. Subsequently there will be texts presented as a combination of two invited keynotes, submitted papers (selected through peer review). The discussion during the debates in between the presentations however is not covered by this report.

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