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Towards a set of integrated guidelines to (re)design ICT-support which will facilitate learners to establish shared mind and cross boundaries when cooperating in competency-based, multiprofessional education.

1. Background and goals

Professionals are increasingly confronted with situations which require them to cooperate with professionals from different backgrounds to reach optimal results. These multiprofessional situations place serious demands on cooperative abilities. In different domains, like for example health and youth care, multiprofessional cooperation is given much attention lately. Professionals cooperating in teams which consist of experts from different backgrounds, are confronted with complex situations: 'In their work, experts operate in and move between multiple parallel activity contexts. (...) Experts face the challenge of negotiating and combining ingredients from different contexts to achieve hybrid solutions' (Engeström, Engeström & Karkkainen, 1995). Educational institutes struggle with how to prepare students, professionals-in-training, for the demands of their future professions.

This research aims to result in 'design knowledge, i.e. knowledge that can be used in designing solutions to problems in the field in question' (Aken, 2004), in the form of a framework. The framework is expected to be usable for educational designers or teachers with experience in educational design. It should be suitable to assess or design effective ICT-support for a competency-based, multiprofessional educational setting. The aim of this research is not to design 'The Ideal ICT-Support'. The aim is to find guidelines which apply to ICT-support which effectively supports learning activities in the above educational setting. With these guidelines, (re)designing different kinds of ICT-solutions should be possible.

The current, main research-question is as followed: *How can ICT-support be designed which will facilitate learners to establish shared mind and cross boundaries, when cooperating in a multiprofessional, competency-based educational setting?*

The first version of the proposed framework consists of three elements (*figure 1*):

- 1) The educational setting, which aims to develop competencies needed to work in multiprofessional situations.
- 2) The (learning) activities which take place in the educational setting.
- 3) ICT to support the (learning) activities.

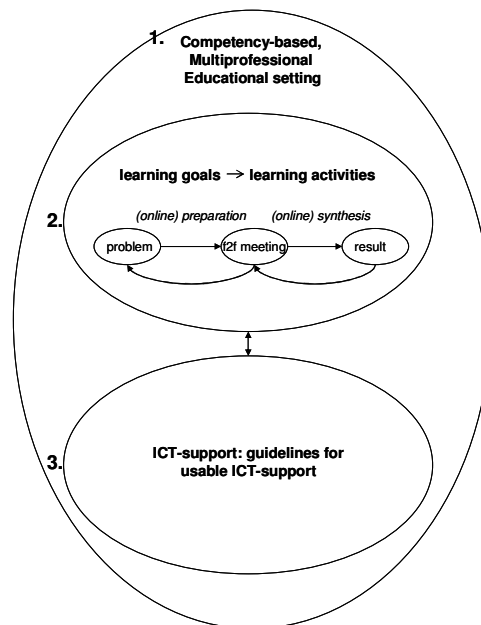


Figure 1: Proposed framework

The following main concepts play a role, which will be defined or briefly discussed below.

1.1 (Multi)professional

In the literature about this subject, both the terms ‘multiprofessional’ and ‘interprofessional’ occur. In literature, the term ‘profession’ is preferred over the term ‘discipline’ since it explicitly means ‘line of work’ or ‘job’, instead of ‘discipline’ which could also be used for different domains within a single profession (Bolhuis, 2002). There is still no consensus on the use of the term ‘multi’ or ‘inter’, in this research a choice was made for the term ‘multi’, simply meaning two or more.

‘Professional’ can be defined in the following way: ‘a professional works continuously at improving his/her vision, methodology, tools and techniques by (1) elaborating on his or her work-competencies by learning from and in practice (elaboration), (2) expanding his theoretical knowledge and insights by learning explicitly from and in research (expansion) and (3) externalising his practical and theoretical insights, which means contributing to the development of the profession (externalisation) and/or to team and organisational learning’ (Simons & Ruijters, 2004).

1.2 Competency

There are many definitions for the term ‘competency’, here a general definition will be used: ‘a competency should at least be interpreted as a combination of knowledge, skills and attitudes’ (Onderwijsraad, 2002). Competency-based education aims to develop the competencies a professional will need in his/her future line of work in a systematic way. During competency-based education, students are viewed as professionals-in-training from the start.

1.3 Shared mind and boundary crossing

For the concept of ‘shared mind’ the following (working) definition was chosen: ‘collective meaning that emerges in and coordinates the activities of a group’ and can be found in literature in a multitude of similar terms such as: common ground, team mental models, shared understanding, distributed cognition and collective mind (Akkerman et al, in progress). The concept of shared mind can be closely related to that of ‘boundary crossing’: ‘Crossing boundaries involves encountering difference, entering into territory in which we are unfamiliar and, to some significant extent therefore, unqualified. To overcome such deficiency, boundary crossing calls for the formation of new mediating concepts. In this sense, boundary crossing may be analyzed as a process of collective concept formation’ (Engeström, Engeström & Karkkainen, 1995).

1.4 ICT-support

The assumption here is that (learning) activities can be organised in such a way that they facilitate students in boundary crossing and establishing shared mind, and that well-designed ICT will help to engage students in, and mediate these (learning) activities. To meet the requirements of future users and of the intended use, careful design of the ICT-support is needed: 'A computer environment to support collaborative learning is not a character-less channel of communication, but is itself a complex designed artefact that embodies its own cluster of meanings. Users must be able to interpret its affordances, to realize how it is intended to be used' (Stahl, 2003).

2. Research design and method

The research design is visualised below.

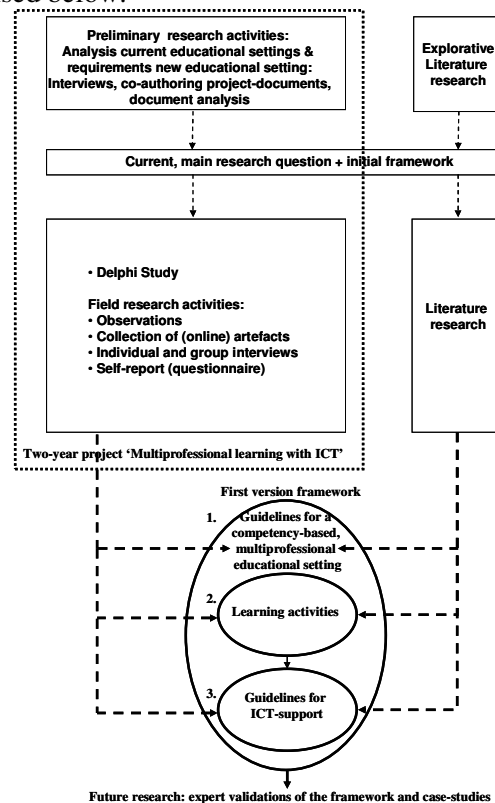


Figure 2: Research design

The first phase of this research is closely related to a two-year SURF-project¹ 'Multiprofessional learning with ICT'. This project takes place in the Health Care domain with the following participating parties: Nursing, Physiotherapy and Speech Therapy Programmes of the Faculty of Health Care (HvU) and SUMMA, School for Utrecht Medical Masters (UMCU).

The research is aiming to result in a framework of 'field-tested and grounded technological rules': 'a chunk of general knowledge, linking an intervention or artefact with a desired outcome or performance in a certain field of application'. These technological rules are holistic in nature: 'A given intervention is applied in a certain context and all organizational and contextual factors have an impact on its outcome. Some of the mechanisms determining its effectiveness will be analysed to ground the technological rules, but other factors will retain their 'black box' character. The description of a rule, context and outcome need not be reductionistic, but can use 'thick' qualitative text' (Aken, 2004).

¹ SURF is the higher education and research partnership organisation for network services and information and communications technology.

Different methods from descriptive research will be used. ‘Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection’ (Glass & Hopkins in (Nelson-Knupfer & McLellan, 1996)).

From evaluation research, the method of expert validations will be used. ‘Expert validations are based on the authoritative opinions of experts of a given topic’ (Maslowski & Visscher, 1997).

Besides, concepts from grounded theory will be used. ‘Throughout the research process, grounded theorists develop analytic interpretations of their data to focus further data collection, which they use in turn to inform and refine their developing theoretical analyses’ (Denzin & Lincoln, 2000).

Also, methods from the field of human-computer interaction (HCI) will be applied, like for example user studies and usability testing.

The above mixed-methods approach fits within the approach of design-based research (DBR), which forms the foundation for this research. Design-based research is not completely straightforward, and has its own challenges: ‘The queasiness about DBR felt by many scholars conservative in their research methods stems from the realization that in DBR studies many variables are deliberately and appropriately not controlled, the “treatment” may evolve considerably over time, and even the research methodologies utilized may shift to fit the morphing intervention. Further, to aid with interpretation under these difficult circumstances, in DBR large qualitative and quantitative datasets of various types are often collected by different participants, introducing substantial problems of alignment, coordination and analysis’ (Dede, 2004).

The following types of research activities are planned.

Literature research	Literature research will be conducted to find input for the framework and to analyse and ground the results of the research activities described below.
Descriptive research activities	Descriptive research activities will contribute towards the framework, support the notion to carry the research out from a holistic point of view and provide input for the ‘thick qualitative text’. During the first phase of the research, the following field research will be carried out in the context of the above mentioned SURF-project: <ul style="list-style-type: none"> – Observations of all face-to-face sessions organised as part of the education. – Collection of all (online) artefacts e.g. (intermediary) products, e-mail and online discussions. – Individual interviews with students and teachers. – Group-interviews with educational designers and teachers. – Self-report by students (questionnaire). – Assessments (peer-assessment and by teachers) will be made as part of the educational activities. These assessments will be taken into account.
Expert validations	The successive versions of the framework will be evaluated by means of expert validations. Experts in this context are educational designers and teachers with experience in educational design.
Case studies	Two (or maybe more) case studies are planned. The developed framework will be used to assess relevant educational settings. The case studies will help to ground and assess the predictive value of the framework.
Development and evaluation	An additional (besides the above SURF-project) development and evaluation of a competency-based, multiprofessional and ICT-supported educational setting is planned (using the framework). However, in view of the experience till now with the SURF-project, it must be considered if that is achievable.

3. References

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