

Design of a Collaborative Learning Platform for Medical Doctors specializing in Family Medicine

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Abstract: Access to occupational knowledge exchange and collaborative learning is highly restricted for doctors in specialty training for general practitioners/family medicine (GPs) in Germany, since they are not organized in coherent vocational training programs. Based on an analysis of the target group's needs, this paper presents our pedagogical concept and a first prototype of a community sharing and knowledge building platform for this target group. This platform can be accessed independently of space and time and shall support collaborative learning with peers.

Introduction

In Germany, doctors need a medical specialization in family medicine to work as general practitioners (GPs). The German Medical Association has empirically shown that there is an increasing lack of GPs in eastern Germany, since 38 % to 48 % of the current GPs will retire within the next ten years and there are not nearly enough graduated doctors specializing in family medicine (Kopetsch, 2010). The affected federal states are mostly spread across large rural areas. Thus, GPs and their trainees are geographically dispersed and have to overcome broad distances to interact with peers. The curriculum of specialty training in family medicine takes at least five years and is regulated by 17 federal medical associations in partly different ways. In a typical trajectory, doctors in special training start with positions in hospitals to fulfill the general requirements that could also be used for other specializations. The phase of working in a GP's office mostly takes place later in the training. Because of the broad spectrum of tasks required in the curriculum of family medicine, doctors in training work in at least four different locations in hospitals and medical practices. These are often separated by large distances and not connected. The five year training is self-organized, which implies that the doctors have to find jobs on their own initiative, partly for periods of only six months. This takes much time and effort (DEGAM, 2009). Except of local initiatives, these conditions often cause doctors in training to be isolated and not supported by organized communities of practice. Peer contacts are hard to establish and often hampered by job changes. Missing opportunities for networking highly restrict the occupational knowledge exchange as well as collaborative learning in peer communities, so that missing team work is often criticized (DEGAM, 2009). To address these problems and needs, the project KOLEGEA (<http://www.kolegea.de/>), which is facilitated by the German federal ministry of education and research, aims to support doctors specializing in family medicine by providing a platform for collaborative learning in occupational, social communities.

KOLEGEA's pedagogical approach

In our pedagogical approach, we focus on collaboratively working with shared cases in the spirit of problem-based learning (PBL). PBL was originally developed to "facilitate the acquisition and practice of clinical reasoning skills through exposure to real patient problems" (Distlehorst & Barrows, 1982) and has been introduced to many medical curricula since the 1970s (Barrows, 1996), thus many graduated doctors are familiar with it. In PBL, students work collaboratively in small groups to solve realistic, ill-structured problems (Barrows, 1996; Hmelo-Silver, 2004). Information needed for solving the cases is acquired through self-directed learning. The teacher's or "tutor's" role lies in facilitating the PBL process rather than transferring medical knowledge. Yet, in addition to being experts on PBL tutoring, good tutors are also considered to be experts in the area of study (Barrows, 1996). PBL involves loops on problem formulation, self-directed learning, problem reexamination, abstraction and reflection (Koschmann et al, 1992). Goals of PBL are the construction of extensive and flexible knowledge, effective problem-solving skills, self-directed, lifelong learning skills, collaboration skills and intrinsic motivation to learn (Hmelo-Silver, 2004).

The GP specialty training is based on learning by solving real problems/cases in every day working life under the supervision of experienced GPs who are accredited specialist-trainers. Thus, learning already is problem-based, self-directed and based on intrinsic motivation. Our goal is to support this through an online community platform for collaborative learning and knowledge building in occupational social communities which aims at overcoming the problem of missing opportunities for occupational knowledge exchange and collaborative peer learning.

For this purpose we build on the existing intrinsic motivation of the trainees to solve real-world cases. Hence, key aspects of the platform are the autonomous creation of anonymous case descriptions and problem formulations based on working experiences as well as the facilitation of discussions and cooperative finding of solutions in small groups. To support these group processes, the case studies should be linked to applicable medical guidelines, studies, articles and web pages (self-directed learning). This approach also has the potential of training the practical appliance of guidelines to actual cases. To provide a hands-on experience, case studies can be augmented by anonymized multi-media contents like pictures (e.g. X-rays or CT scans), sketches (e.g. position of aches or wounds), videos (e.g. motion sequences) and sounds (e.g. untypical coughing noises) that are approved by the patients. While we focus on learner-generated use cases, there will be an initial collection of realistic multi-media case studies to prevent cold start problems and provide best practices.

Social interaction as well as collaborative learning is supported on different levels. Our focus for collaborative learning is the small group. There are two types of small groups with regards to the tutor. For the challenging period of working at a GP's office (see next section) tutors ("mentors") are experienced GPs, who not only facilitate the PBL-process, but also support the trainees based on their experience in finding high quality solutions. These groups provide their own cases and collaboratively identify possible solutions based on medical guidelines. After solving a case, the results are quality controlled by the mentor and can be published in the platform's archive to be used as "emerging learning object" (cf. Hoppe et al., 2005) for the whole community. Thus, our platform also supports a knowledge-building community in which members create shared knowledge artifacts on the basis of current research and theory in the context of authentic practice (cf. Steinkuehler et al., 2002). Furthermore, the platform admits and hosts self-regulated small groups without constant support of an experienced GP. In these groups a trainee who is experienced with PBL can adopt the role of the tutor. In addition to discussing own cases, archive cases can be used to train the appliance of specific medical guidelines or to extend knowledge in certain fields. For example, these groups are adequate for trainees preparing for their final exam or maintaining contacts.

Apart from the work in small groups, there will be tools for community support like forums, which can be used for occupational, but also social exchange. Following Steinkuehler et al. (2002), we consider group discussions to be asynchronous and threaded, since this can produce discussions and results of higher quality than synchronous communication and is more flexible regarding time. To particularly aid trainees in rural areas and areas with low infrastructure, we support mobile recording of multi-media notes as well as mobile services to access to the portal.

Analysis of the target group

To decide, whether such a platform is suitable for the target group and which contents are considered especially important, we used an online questionnaire, receiving 73 responses from family medicine trainees. In addition we conducted 15 qualitative phone interviews with stakeholders, including experienced trainers and representatives of medical associations. Since there is no monitoring of the number of doctors in specialty training, the accurate size of our target group is not known. In 2008 as well as 2009, there were around 1200 acknowledgements of new GPs in Germany (Kopetsch, 2010). Extrapolating this number regarding the five year training, the target group consists of at least 6000 trainees.

The target group's attitude towards computers was measured based on FIDEC and the confidence based on COMA (Richter et al., 2010). The trainees show a very positive attitude towards computers as instruments for working and learning and are rather confident of their usage (see Figure 1). They are also open for new technologies, thus, 59% could imagine tablets and 32% smart pens as potentially helpful for their daily work, although only few are familiar with the usage of tablets (11%) and non with smart pens.

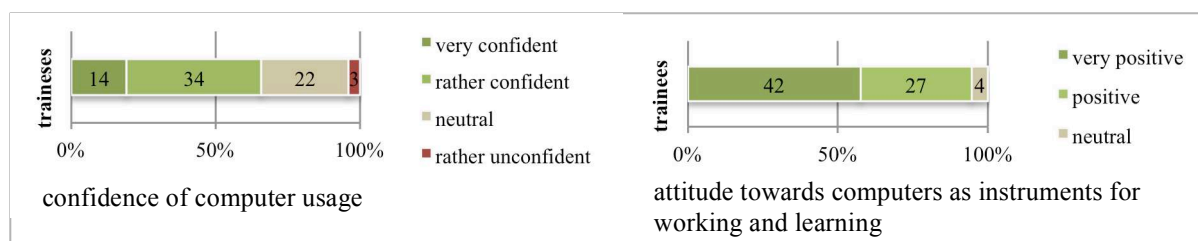


Figure 1. Confidence of computer usage and attitude towards computers.

We found that the majority of trainees uses the internet for gathering information rather often (61.6% daily, 31.5% several times a week) and 71.2% use online learning platforms in general. Regarding online learning, they especially like the independence of time (92%) and space (89%) and the easy accessibility of information and materials (84%). Reasons for not using online learning platforms are mainly missing opportunities (16.4%) and awareness (5.5%). The interviews show that in order to enable trust and collaborative learning trainees and

trainers request a platform to be a protected zone only for doctors, without access for patients or laymen. Furthermore, there has to be a quality control of the contents. During the interviews, trainers and representatives of medical associations expressed the desire for a stronger integration of medical guidelines into specialty training. A well-known approach for practical medical training is the discussion of case studies: 90% of the polled trainees consider them suitable for learning, 81% can image to derive therapy recommendations, 70% expect support for diagnoses and examples for uncommon diseases, 62% consider them as a medium for discussing contents with colleagues and 48% as useful for safeguarding difficult decisions. The interviews highlight that learning with case studies reduces the level of abstraction and enables working based on symptoms (a main approach in general practice) and not only by taking typical disease patterns into account. To create a hands-on experience with case studies, they should not only contain text, but also multi-media objects like pictures, videos and sounds. According to the survey conducted with trainees, they are familiar with many recording and editing devices and they already use them for work (see [Figure 2](#)).

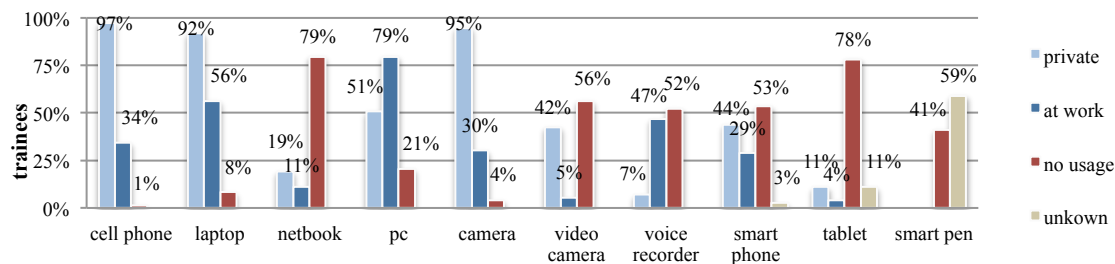


Figure 2. Trainees' tool usage.

Furthermore, the interviews show that the phase of working in a GP's office is especially challenging. Doctors starting their specialty training are usually familiar with working in hospitals where they can consult different specialists, have many diagnostic opportunities, treat only patients related to one field at a time and concentrate on a limited number of patients. Whereas in a practitioner's office, they only have one reference person, highly restricted diagnostic opportunities as well as a diverse and unrestricted field of consultation purposes and disease presentations. Furthermore, they treat a high number of patients within little time, requiring fast decisions. Thus, there is often uncertainty and an unsatisfied need to discuss unusual or problematic cases, e.g. to receive feedback on alternative diagnoses or therapies to support the decision-making process.

Summarizing these results, the target group is ready to use the planned platform regarding their technology acceptance and competence, but stress that trust is an important factor. To enable trust on a social level, only doctors registered as members of the Medical Association (registrations mandatory for all German physicians) will have access to the portal and face-to-face kickoff workshops will be conducted. As considered in the pedagogical approach, learning by discussing case studies is well established and will therefore be central in our platform. Furthermore, there will be support to access and link medical guidelines to improve their integration into specialty training. Since the phase of working in a GP's office is especially challenging, PBL groups in this phase will be supported by experienced GPs.

Prototype of the KOLEGEA environment

The KOLEGEA environment will consist of a web portal and mobile (tablet, smart phone and smart pen) applications for accessing the portal and multi-media note taking. Currently (after one year of the three year project) there is a first prototype of the portal focusing on the creation and representation of multi-media case descriptions and their discussion as well as a tablet app for multi-media note taking for medical cases. Both tools have already been exposed to the target group on five occasions. The feedback was positive, but it was pointed out that in order to use the system trainees require time provided by their training institutions or employers.

Regarding the role of technology, the mobile note taking app is conceived as a digital replacement for analog pen and paper notes with the added value of multi-media integration as well as digital availability of notes and media for the creation of authentic case descriptions. Since doctors have limited time during a patient consultation, we expect them to only collect basic information on the patient's case using the tablet and complete the case description using the web portal on a PC or laptop afterwards. The portal provides access to the virtual community and its knowledge artifacts (user-generated contents as well as links to artifacts of current research). Figure 3 shows an example of a case description, its discussion and links to knowledge/learning resources used in the discussion. The case description is structured based on the phases of the medical consultation containing information about the anamnesis, examination, diagnostic investigation, tentative diagnosis and procedure. Photos, handwritten notes and text, but also videos and sounds can be integrated to a

case description and shared with the small group. Discussion is enabled with a forum like tool, which facilitates comments on the problem as well as on the comments of other group members. Furthermore, knowledge and learning resources relevant to the problem can be shared.

The screenshot displays the KOLEGEA portal interface. On the left, a case study titled 'Cardiac Insufficiency' is shown with a central image of a patient's arm and a question: 'Can I give Furosemid IV in an ambulant treatment if the patient has low blood pressure?'. Below the image are navigation tabs for 'Anamnesis', 'Examination', 'Diagnostics', 'Tentative Diagnostics', 'Procedure', and 'Additional'. A 'detailed description of case study' label is placed below this section. To the right of the image is a 'General Information' sidebar containing author details (Svenja Schröder), patient information (female, 73 years old), creation and modification dates, and status. Below this is a 'guidelines' section with a 'Cardiac Insufficiency' link, and an 'Additional Links' section with links to MedForum, MedScience, and an edemas gallery. A 'links' label is placed below this sidebar. On the right side of the portal, a 'discussion of case study' forum is visible, showing a thread with comments from Dr. Autumn, Dr. Winter, Dr. Summer, and Mentor Dr. Spring. A 'Write a comment:' box is at the bottom of the discussion area.

Figure 3. Portal prototype with medical description (left) and discussion (right).

Discussion and Prospects

We have introduced our approach as well as a first prototype of a community portal for supporting occupational exchange and collaborative learning of doctors in specialty training for becoming general practitioners. Our approach is supported by an analysis of the target group, which considers the opinions of trainees (bottom up), as well as trainers and representatives of medical associations (top down). Exposition of our prototypes to the target group generated positive feedback, but also indicated the necessity of training (time) to use it. We are currently acquiring training institutions and especially GPs who are willing to support their trainees in using our platform. Furthermore, we are conducting usability tests with the target group, but also with usability experts to further enhance our tools for the pilot operation phase, which will start in June 2013.

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