

EDUCATING STUDENTS IN A SWEDISH REGIONALIZED MEDICAL PROGRAM THROUGH THE USE OF DIGITAL TECHNOLOGIES

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Abstract

In 2011, the first regionalized medical program (RMP) started in Sweden. Digital technologies are used for educational and administrative purposes. This paper explores medical teachers and administrators' understanding of faculty preparations, their own preparedness and expectations related to the implementation of the RMP. A survey was distributed to teachers and administrators. Early findings indicate that the use of digital technologies began at a small scale, but there is potential for increased development. It is concluded that although teachers and administrators have a limited experience of distance education, the faculty has been able to create a feeling of being prepared.

Introduction

In contemporary society, universities have transformed to encompass dual modes where both online and on-campus learning options are available (Power, 2008). New digital technologies allow more flexible and innovative educational technology and course design solutions (Olofsson & Lindberg, in press; Schneckenberg, 2010). This is the case also in medical education, where the use of digital technologies accordingly has grown rapidly (Maley, 2008). Digital technologies in medical education are said to offer a wide range of options to meet changing demands, in terms of availability and quality of education, from both the society and the students (De George-Walker & Keeffe, 2010). The educational practice focused on in this paper — educating medical students in a so-called regionalized mode, using digital technologies — is a relatively new phenomenon in medical education (Eley & Baker, 2009). Regionalized medical programs (RMP) are primarily applied in Australia, Canada, UK, and Asia (Eley & Baker, 2009; Lau et al., 2004) and are considered as an opportunity to overcome the lack of medical doctors in rural hospitals (Lau et al., 2004). RMP contributes to building a genuine awareness of both clinical clerkship and rural clinical clerkship, while the rural hospitals are afforded the opportunity to recruit

medical doctors (Eley & Baker, 2009). The rural clinical clerkship provides good learning opportunities due to smaller student groups and more diverse patient cases (Worley et. al, 2000). To enable medical students' theoretical studies during their rural clinical clerkships, digital technologies are used (Janes et al., 2005). Nevertheless, RMPs are not entirely dependent on digital technologies, though they feature a significant number of teaching and learning activities using such technologies (Lau, 2004). Instead of collected or dispersed localization, the students are distributed in groups at different geographical locations participating in theoretical studies through digital technologies. Even though digital technologies, according to previous research, are expected to be a prerequisite for RMP, the body of research related to RMP and digital technologies is rather limited. In a literature review, Lau et al. (2004) point out the following, with respect to RMPs: "To date these programs are described as being rooted in rural clinical experience, and the potential contribution of e-learning to enable distributed undergraduate medical education into nonurban geographical settings has not been reported" (p. 72). According to Janes et al. (2005), the use of digital technologies in RMP is now, and in the future, expected to be an absolute precondition for overcoming isolation and improving knowledge flow.

In January 2011, Umeå University in Sweden was facing its first attempt to transform the existing medical program into an RMP. In this paper, a contextual description of the first RMP in Sweden will be presented. More specifically, the aim is to explore the medical teachers and the administrative staff' understanding of the faculty preparations (in this paper, faculty embrace the concept of a division within one or a number of subject areas, in this case related to the RMP), their own preparedness and expectations when implementing an RMP in Sweden supported by the use digital technologies.

Implementation and Faculty Preparedness

Previous research shows that successful preparations for and implementation of digital technologies in higher education in general often involves human factors. Schneckenberg (2010) puts forth that the academic staff involved in the implementation phase face great challenges, both technical and pedagogical. Teachers, as designers of courses, and in constant and direct contact with students, seem to have a major impact on the success of implementation. Schneckenberg describes teachers' so-called e-competence as a related component to successful implementation of digital technologies, at the same time that he points out that this is not always an easy task to accomplish, due to the fact that "a critical mass of academic teachers still lacks the competence that enables them to know and to judges why, when and how to use digital technologies in education" (p. 413). In relation to RMP, Janes et al. (2005) claim a lack of application of e-learning among regionalized medical teachers related to inadequate computer skills. A similar line of thinking is expressed by Kitsantas and Dabbagh (2009) who argue that teachers must learn how to use digital

technologies in their teaching. This also includes meeting the students' demands for flexibility and modern use of the technologies for learning purposes. Kirkwood and Price (2005) report that teachers' underlying conceptions of teaching and learning affect the way technologies are used. Two teaching categories here are a) technologies to transmit the knowledge, and b) technologies to facilitate student learning. To transmit knowledge, streamed/live-send lectures and PowerPoint® are frequently used. The transmitting usage of digital technologies often enables students to learn and be taught regardless of time and space, but does not provide any changes in the fundamental educational praxis. First, when teachers and faculties challenge their existing conceptions and practices of teaching, digital technologies can be understood and used in ways that further facilitate student learning.

In medical programs, so-called traditional lectures have always been highly valued (Koller et al., 2000). Lately, such lectures have in many cases been carried out in streamed and video-linked modes (Callas et al., 2004; Cardall et al., 2008; Mattick et al., 2007). This transformation is seen as a major advance in medical education (Wang et al., 2010) and these modes are perceived as a good start for teachers with limited experience of digital technologies in educational settings (Ellaway & Masters, 2008). On the other hand, in relation to the rapid development of digital technology for learning purposes, researchers have raised the following question: "Given the advent of the e-revolution, why is lecturing in any form still necessary?" (2001, p. 231).

In medical education, given factors like users' previous experience, preparedness and time available, Koller et al. (2000) argue that less complicated digital technology projects and solutions should be implemented first. Adding new and more advanced solutions while working on development and implementation often requires a higher level of experience and preparedness among staff. Previous research also indicates that teachers must be comfortable with the digital technology solutions in order to permit a change in the teaching practice (Olofsson & Lindberg, in press). Brakels et al. (2002) also support a gradual implementation of digital technology in education. When implementing digital technologies in an academic organization, they suggest a three-line implementation where access to technical equipment needs to come first. The second line refers to staffs' usage of the digital technology equipment to learn how to use them in a pedagogical way. In the third line, deeper usage is supposed to achieve "new innovative educational formats" (p. 75). Ellaway and Masters (2008) divide the implementation and usage of digital technology in medical education in two parts: content and process. While content implies accessing educational materials such as course material, books, streamed lectures, etc., the process implies the structuring of human activities such as online communication, seminars, cases, e-assessment, etc. Even though Ellaway and Masters argue that both dimensions are part of successful usage of digital technologies, they claim that medical faculties are often applying content in a higher extent when implementing and using digital technologies. The reasons are defined as cultural

conceptions of the use of digital technologies. The authors say that “some people see e-learning as being about ‘accessing stuff’ and some see it as about ‘doing stuff’” (p. 458). Common in medical programs are the former.

If successful implementation of digital technology in education requires gradual implementation and experience among users, formal and informal faculty development courses seem to be of importance. In addition to factors relating to expenses and time, Schneckenberg (2010) claims that established digital technology faculty courses are not “linked to the real teaching and learning contexts of academic staff” (p. 413). Granger et al. (2002) in their turn advocate informal digital technology training within the faculty to be more rewarding; this includes good relationships and collaboration among the teachers and other staff.

This short review of previous research shows that human factors such as experience, preparedness and activity can be considered to be of importance for the implementation process of digital technologies in higher education. Teachers and other faculty staff must feel comfortable with the digital technologies implemented and used. The message seems to be to start at a small scale and avoid large and unmanageable implementation processes. Video-linked and streamed lectures are, according to previous research, a good starting point, while the use of advanced digital technologies should come later. The implementation and usage of digital technologies can be understood as both containing content and process aspects. As medical education has a strong tradition of lectures, content is often implemented first. Finally, both pedagogical and technical aspects are said to be important in the implementation process.

The First RMP in Sweden

Based on a government decision — *Expansion of the Medical Program* (The Swedish Government Office, 2007) — the RMP at the Umeå University in Sweden became reality. The result was a national expansion of student positions in which 17 positions were distributed to the medical program in Umeå. A regionalization was therefore current to facilitate reduced crowding of students at the Umeå University academic hospital. At the same time, and equally important, the regionalization was an opportunity to expose medical students to clinical clerkship in rural hospitals. From the sixth semester (1–5: pre clinical, 6–11: clinical) the medical students are located at four study locations (Umeå, Östersund, Sundsvall and Sunderbyn) in northern Sweden, as they perform their clinical semesters. Of these, 8–12 students are located in the three different rural hospitals and 70 at the Umeå University academic hospital. One administrator is located in each location for administration and to support teachers and students. Linked to each semester and location are two teachers responsible for the location-specific learning; this includes local learning case, examinations, tutorials, etc. In the future, all teachers are supposed to teach all students regardless of location. The two-way teaching (lectures are both received and sent

from each location) contributes to seeing that teaching responsibility is distributed across all locations.

Digital Technologies in the Swedish RMP

To enable medical students' theoretical studies during their rural clinical clerkship, digital technologies are used. In the RMP educational guidelines, the vision of the digital technology usage is highlighted as follows: "The Medical program will to a high extent use digital technologies. Digital learning resources such as simulations, wikis, digital video and pod casts will be a natural part of educating medical teachers." Each location is equipped with two study rooms which can send and receive lectures. Students have free access to internet and a video-conference system. A Moodle course platform was developed to facilitate the students' new educational situation.

Preparations for the Use of Digital Technologies in the RMP

In order to help the medical faculty to build and organize the Moodle course platform two educational technologists with long experience were hired (each on a half-time basis) from the Department of Education, Umeå University. In cooperation with the so-called subject-responsible teachers and administrators, the technologists constructed and adapted the structure of the platform. As a part of the development, responsible teachers had both to review their current educational related content (lecture material, cases, examinations, etc.) and to identify what content was suitable for short streamed lectures. The platform was also supposed to give the students a better and more flexible opportunity to review their own studies: grades, lectures, course content, etc. The educational technologists introduced all teachers and administrators to the course platform through optional two-hour seminars. This included recording streamed lectures and instructions on how to navigate the platform. Further, policy documents concerning both technical and pedagogical aspects were made available to the teachers. Regular meetings at different levels of the faculty were held; digital technologies were always a topic to be discussed. Student volunteers received a one-hour introduction to the technology equipment, to support inexperienced teachers when live-sending lectures.

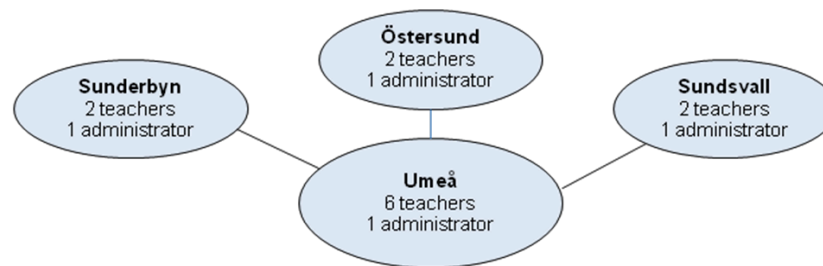
Method

The data in the study was collected using an online survey distributed to sixteen medical teachers and four administrators before the first regionalized semester in 2011. Respondents (working on the first regionalized semester of the RMP in Sweden and highly involved in the regionalization) were selected in consultation with a key figure in the RMP. The online survey, based on five graded scales and open questions, included a total of 50 (for teachers) and 46 (for administrators) questions within following four themes:

- previous experience of digital technologies,
- their understanding of their own and the faculty preparedness,
- expectations of the use of digital technologies, and
- expected changes when implementing RMP and digital technologies.

The survey was responded to by 12 teachers (11 men, 1 woman) and 4 administrators (4 women) in the sixth semester of the RMP. The respondents were physically located as shown in Figure 1 below.

Figure 1: Respondents' Locations



Findings

In this section, some early findings from the online survey will be presented. Both quantitative and qualitative data are included. Teachers' responses are coded 1–12 and administrators' 13–16.

The average time spent teaching in the medical education program by respondents is ten years among teachers in Umeå and one year (or less) among teachers in Östersund, Sundsvall, and Sunderbyn respectively. The administrators had been working one year (or less) as administrators for the medical program. Teacher and administrator extent of previous experience of digital technologies is shown in Table 1 below. The results show a high level of computer skills, while the level of experience with the platform and with distance education is low.

Table 1: Teachers' and administrators' previous experience of digital technologies

	Low extent	Neither high nor low	High extent	Total of 12
Teachers				
Self-rated computer skills	0	3	9	12
Experience of lecturing via Moodle	9	0	3	12
Experience of distance education	10	1	1	12
Administrators				Total of 4
Self-rated computer skills	0	0	4	4
Experience of administrating via Moodle	4	0	0	4
Experience of distance education	2	2	0	4

Teachers' and Administrators' Preparedness and Understanding of Faculty Preparedness

As can be seen in Table 2, both teachers and administrators agreed that they had participated in preparations for the RMP and related use of digital technologies. Nine teachers said that the faculty had prepared them enough for lecturing via Moodle; meanwhile, three felt they were neither prepared nor unprepared, but expected to be fully prepared before spring of 2011 (before the RMP started). Among the administrators, one reported having been prepared; another reported not having been prepared; and the other two reported they were neither prepared nor unprepared, but expected to be fully prepared before spring 2011.

Table 2: Teachers' and administrators' understanding of faculty preparations

	Low extent	Neither high nor low	High extent	Total 12
Teachers				
Has the program prepared you enough to lecture via Moodle?	0	3	9	12
Do you feel prepared to work with an increased use of ICT?	0	4	8	12
Do you feel involved in the implementation of the regionalization?	0	4	8	12
Administrators				Total 4
Has the program prepared you enough to administrate via Moodle?	1	2	1	4
Do you feel prepared to work with an increased use of ICT?	0	1	3	4
Do you feel involved in the implementation of the regionalization?	1	2	1	4

Expectations of the Usage of Digital Technologies when Implementing the RMP

Teachers and administrators were asked about their expectations when implementing digital technologies in the RMP. Desired and anticipated uses of digital technology-assisted teaching elements in the RMP are shown in Table 3, below.

Table 3: Which digital technology-assisted teaching elements are the teachers expecting and feel that they want to use in the RMP?

	Low extent	Neither high nor low	High extent	Total of 12
Teachers				
Live-send lectures	3	1	7	11
Streamed lectures	0	1	10	11
Preparations for case	3	5	3	11
Case	6	2	3	11
Simulations	6	0	3	9
Seminars	3	4	3	10
Examinations	7	1	2	11
Communication	1	1	10	12
Information for students	0	0	12	12

The results indicate a dominance of digital technology-assisted lectures, together with information and communication with students. In cases of the lowest extent, simulations and examinations are expected to be used via digital technologies.

Table 4: Indicate how many teachers and administrators expect, to a high/very high degree, to use the following ways to communicate with students within the RMP

Teachers								
Students within:	Lectures	Physical meetings	Moodle	Chat	E-mail	Paper	Video conference	Total
Same location	5	8	7	1	3	0	2	26
Other locations	2	1	6	2	4	0	2	17
Administrators								
Students within:	Lectures	Physical meetings	Moodle	Chat	E-mail	Paper	Video conference	Total
Same location	0	2	4	0	3	0	0	9
Other locations	0	0	2	0	0	0	0	2

Table 4 shows that when teachers performing live-send lectures they expect to communicate with students in the same location to a higher degree than with students in other locations. It also indicates that teachers and administrators perceive more optional ways to communicate with students within the same location (26 ratings among teachers and 9 among administrators). The administrators' role is primarily to support students in the same location, which can explain the low communication with other locations.

When it comes to communication, 11 out of 11 teachers consider (in an open supplementary question) that teacher-student and student-student communication have a major impact on student learning. Even communication between students and administrators is considered by most teachers to have high or very high impact on student learning.

Expected Changes when Implementing RMP and Use of Digital Technologies

In this section, some findings from the open questions are presented. One of the main findings shows that four administrators and seven teachers believe they have to change their already existing educational practices due to the implementation of the RMP and related digital technologies. Mostly, the concern is about expansion of streamed lectures, pointed out as: *In particular, more streamed lectures* (3). Other expected changes include construction of strategies for engagement and communication with students, mentioned as: *A need to come up with a strategy to communicate with students* (11). The communication also entailed anticipated problems regarding the distribution among the students: *Risk of poor communication with students who are distanced in cases of lecture elements* (10). This was also pointed out as: *The absence of students in the same physical location probably requires that I must better engage students in other locations* (1).

Most of the teachers and administrators feel there is faculty support for making changes in the educational and administrative practices. Ten of 12 teachers also believe that the students' will change their ways of studying. In particular, that

they will see more streamed lectures instead of live-sent lectures, and use the internet to a higher extent: *Maybe choose to see a streamed lecture instead of go to the video-linked one* (6) also explained as: *More used [students] to search for info on the net* (8). The students are also expected to handle their own studies more independently: *Plan their studies more by themselves* (5). Among the administrators, only one believes that students will change their study patterns.

Most of the teachers and all administrators think that the RMP, with its intertwined digital technologies, will become equal or better in terms of educational quality. The teachers also expect the RMP to provide equal learning opportunities for students, regardless of regionalization or location. The advantages are mainly the improved review of course content via Moodle, expressed as: *Improvement expected, review of materials that can be presented in a more modern way* (2). Further benefits regarding improved communication and possibilities for students' activeness are pointed out as: *Easier to communicate. It is not tied to lectures in the same way* (5): *More active seeking of info themselves [the students]* (8).

The development of the course platform has contributed to a high level of online access of educational materials (e.g., lecture content, number of examinations, course structures, overlaps between courses, etc.). This contributes to a high degree of transparency in the program regarding both content and structure. This is perceived as a positive dimension of RMP among the majority of teachers and administrators. One teacher, however, adds that *it requires that the teachers prepare well in advance* (10). Almost half of the teachers express a fear of technology problems, such as technology hassles and lack of user experience. This is pointed out as: *Do not know until it has been tried, but as usual it can be expected that the technology does not always work as intended* (4). Furthermore, the decreased personal contact with students is expected to affect the medical students' professional development: *Personal contact with students can be more restrained, more difficult to incorporate "soft" skills for their future profession* (11). Another teacher thought there was limited time to learn how to use the technologies: *Very hectic and a little time to test yourself to learn more* (16).

There is also a modest positivity among the teachers related to the implementation of the RMP and the extended use of digital technologies. The benefits are particularly in the review of the teaching: *Review of the whole of the teaching* (5), the reduced travel: *Training can be conducted with great coverage without having to travel to a specific location* (9), the opportunities to learn how to use the digital technologies: *Opportunity to develop skills in teaching with technology* (10), and the 24/7 access: *Knowledge and information are available around the clock, not just certain occasions, as for example at lectures* (11).

Discussion

For the first time in a Nordic country, a medical program is carried out in a regionalized mode. For a highly established medical program, the transformation to an RMP entails modifications and a solid transformation work. As pioneers, the teachers and administrators in the Swedish RMP do not surprisingly perceive challenges that the faculty must undergo to get through the implementation phase. In this section, some of the perceived challenges, expectations and understandings among teachers' and administrators' will be discussed.

Early findings indicate that most teachers expect to mainly use digital technologies for four purposes: information, communication, live-send and streamed lectures. The usage indicates a focus on content, where access to lectures and information are most important. According to Ellaway and Masters (2008), the content dimension is often the first to be implemented in medical programs. The reason seems to be the deep-rooted culture of lecturing and transmitting of knowledge (Koller et al., 2000) which follows into the use of digital technologies. The benefits of transmitting knowledge are also, as Kirkwood and Price (2005) argue, that students can participate regardless of time and space. This also means that the Swedish RMP can meet its students' changing demands for flexible education, as is expressed both in previous research (Kitsantas & Dabbagh, 2009) and in the early findings from this study. Though, as research indicates, the use of technology for transmitting knowledge will not in itself permit any changes in the educational praxis. Technology-based lectures can be seen as one precondition for students to undergo their theoretical studies.

For more developed RMPs, the transformation of the Swedish medical program to an RMP can be viewed as a weak attempt to implement digital technologies, especially with reference the growing accessibility to more advance educational technology-based design solutions (Olofsson & Lindberg, in press). However, it is important here to take the implementation in steps, where the first step is to get access to suitable digital technologies (cf. Brakels et al., 2002). Second, it is important for staff to get to know these technologies in a pedagogical way. Finally, it is key to look for new and more advanced solutions (Koller et al., 2000). In this case, more advanced solutions such as process-dimensions or complex learning activities shall come in the third step. Regarding to the findings, the third step is further ahead in the future. Despite this, in relation to earlier research, the Swedish RMP, started in a good way, when letting inexperienced teachers' live-send and record streamed lectures as a starting point (Ellaway & Masters, 2008).

Although there is still a lack of distance experience and expected difficulties with the technologies, teachers and administrators feel that the faculty have prepared them enough for the implementation and the extended use of digital technologies. Reasons for this may be the Swedish RMP's deviation from the established digital technology courses which are, according to previous research, rarely linked to the

academic educational context (Schneckenberg, 2010). Instead, the faculty preparations has included development and structuring of Moodle and streamed lectures, performed with proximity to teachers, administrators and program content. Difficulties and problems arising during the development and implementation have been resolved close to the staff and program context. Teachers and administrators have had the opportunity to gradually get comfortable with the technologies, while professional scaffolding was available at all times. The ability to make the employees feel prepared through the faculty preparations in the RMP may further constitute a fertile ground for future implementations, such as more advanced technology solutions suitable for process-oriented learning activities (Ellaway & Masters, 2008) or development of facilitating teaching praxis (Kirkwood & Price, 2005). To conclude: Together with having recruited both new teachers and administrators in each location for support, cases, tutorials, seminars, etc., the program is on the right track and with possibilities to change the established faculty culture, that is, to make the RMP a modern medical program.

Future Research

In the future, it will be interesting to further explore how teachers' conceptions of teaching and learning via digital technologies will affect the ways these are used in the RMP. In addition, to study how students' conceptions of social media would affect the significance for their learning. Finally, to design and implement a true process-dimensioned learning activity carried out via digital technologies in order to investigate if it can enhance medical students' learning.

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