Punktum-projekt – slutrapport –PUNKTUM Project Final Report

Student Active e-Learning Approach to

Climate Change and Health Research Methods

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- **PROJEKTETS SYFTE-THE PROJECT AIMS**

What do you want to achieve with the project?

Noting the demand for increased accessibility to our research team's educational offerings and the opportunity to enhance the quality of the education we provide by leveraging e-learning more in the future, the primary purpose of this project was to develop a postgraduate web-based course within the climate chan*ge and health research program* focused on student active learning. Moreover, we were keenly interested in maintaining our interdisciplinary approach in both teaching and learning of the research methods course on climate change in health. While we wanted to move toward student active learning in cyberspace, we also endeavored to continuing to bring together a group of students with diverse geographic and professional backgrounds with our teaching staff coming from equally broad areas of expertise. Lastly, we hoped that our conscientious process in piloting different techniques and technologies would be a valuable learning experience and training opportunity—building a knowledge base within our Research Theme and Unit not only for those members of our Unit directly involved in the course, but also others involved in teaching teams wishing to integrate more e-learning into their pedagogic repertoire.

- **PROJEKTMÅL-PROJECT GOALS**

Vilka mål hade ni i början av projektet? What goals did you have at the beginning of the project?

The primary purpose of this project was to develop a postgraduate e-learning course within the climate change and health research *program* at the Epidemiology and Global Health Unit. As part of this project, we initially proposed e-learning course planning, development, implementation, and evaluation aims to increase the quality and effectiveness of climate change and health research education along three dimensions: increased accessibility and sustained diversity, higher level pedagogi*cal development of the program*, and student centered active learning.

The specific goals of this project linked to its purpose were as follows:

- To evaluate the strengths and weaknesses of past iterations of climate change and health research education in terms of class composition, course organization, pedagogical taxonomic content, materials, learning activities, and above all student learning outcomes by summer 2015. ⌗

- To generate new teaching materials adapted to the e-learning environment for the Climate Change and Health Research Methods Course with specific attention to increasing the active role of students in their own learning by autumn 2015. ⌗

- To roll out a full version of an e-learning graduate course on climate change and health by late spring 2016 after pilot modules of an e-learning course in different international settings with collaborating centers in Asia during autumn/winter 2015-16 ⌷

- To share our "lessons learned" in the planning, development, implementation, and evaluation of transitioning graduate training modules on climate change and health to e-learning within the Unit's teaching community by autumn 2016.

- **GENOMFÖRANDE-IMPLEMENTATION**

Arbetssättet för att uppnå målen -The working method to achieve the objectives

With our project goals, we were trying to achieve something ambitious, but which we felt was possible and necessary to serve our students better—to offer a research oriented course on a rapidly evolving field of science that allows students to be at the center of their learning experience –but this time using in cyber-space instead of our ordinary classroom space in Northern Sweden, to afford more of our global health students from across the world the opportunity to take part by avoiding the difficulties of scheduling, logistics, and other barriers to the traditional Umea-based course.

A great deal of the projects initial phases was on understanding our course itself, both past iterations and our future vision. We started with a series of internal and external meetings among those who had previously been involved in the course or partnered on delivery or generation of course content. This included meetings with those who had been around for the first iteration of the Research Methods course and the formation of the Research Theme on Climate Change and Health, as well as those who had a hand in writing the original course syllabus, those involved in coordinating the course as well as many of the local and guest lecturers from the years it had been offer in Umea. Alongside, conversations among ourselves regarding the previous course(s), we considered the history available in terms of our collected history(ies) of the presentations, schedules, literature, learning activities, labs/exercises, assessments, exams, students' evaluations and lecturers' reactions to the course(s). This was a serious undertaking which began before the PUNKTUM project itself, but was very much a part of our process of taking inventory and reimagining the course to be more student centered and supported by e-learning.

Next, in the research arm of our process, we considered formats and examples of student active and e-learning specifically utilized in learning and teaching of topics related to our course. In some ways, this also served as market research for our course and allow us to better assess what sets our course apart from others available. During this phase, we investigated online hosting platforms and e-learning technology as well as modality of teacher student interaction, learning assessment techniques, and survey the field of topics already available for students in the marketplace, so to speak.

Based on our preparatory phases, through conversation with colleagues and our own student active e-learning participation in numerous online course on climate change, public

health research methods, and student provided problem-based learning, we discovered paths forward in forging our refined syllabus new course structure tailor for student learning in an e-learning environment. Importantly, our increased knowledge base also highlighted our own technological and platform challenges, which needed to be addresses as we moved into building modules, learning activities, and piloting the material with students and colleagues.

Once we had been able to ascertain strengths and weakness in our aims and goals, and to an extent checked them against some of the realities of students' needs, instructors'' time and other stakeholders' expertise, we set out to pilot a few of our modules and eventually run an e-learning course. As the project team led by Dr. Quam and Research Theme Leader Associate Prof. Rocklov sat with others, we determined specific learning goals, course content, format, learning tasks, assessments, and evaluations to be implemented. We focused on the development materials adaptable for e-learning and taking into account a purposeful pedagogical progression toward higher level thinking throughout the course. Despite all our research in the preparatory phases and revisions, we still basically had this mind-set that we could get good recordings and editing done to get from our live-format course(s) and workshops to the course envisioned.

This idea of recording well-thought out live-classroom instruction and exercises on climate change and health research methods courses and workshop was in part true; at least in production of materials for the ambitious early pilots. However, ultimately, we learned that e-learning modules, like the live course modules before, could benefit from a few iterations—several more that may still be yet to come. The pilots taught us several other things too. We learned that we wouldn't have the ability to have the same student vetting and pre-requisite knowledge assessments in e-learning format, or at least not in the same way. So this is to say that our students fundamental knowledge base, background etc. may be at a different level than the materials we designed…which would on one hand be a positive increase in the number and diversity of our course participants but on the other decrease the student-centered goals to a degree. Furthermore, we found our e-learning pilot models did better far at conveying content on background and fundamental foundations of the subject material than drawing out deep student engagement with the material as researchers, asking their own research questions, compared to our analogous live-versions of those kinds of learning activities.

Moreover, particularly in some settings and for some individuals, technology was more supportive of our students' learning than in other settings where it indeed posed a barrier. Like there is a phobia of mathematics, we too found e-learning was not a preferred modality for all students and teachers. For some, the parts of the course which were indeed least helpful or productive in their qualitative evaluation of the course and pilots, were those computer-based exercises and modules that we thought would be most suitable for transition to e-learning. In fact, for many reasons to make up for the limitations of our modality of instruction, we moved somewhat into a hybrid e-learning version of the course during some of our traveling pilots and during the last offering of the live-course.

The implementation of the PUNKTUM project, also coincided with some larger changes in the courses supported by our Research Team and the Unit as a whole within the Medical Faculty. As a result, we did not ever role out our full scale new course, but rather d the time and effort we invested evolved into the development of several course's modules, which included some of our e-learning modules and lesson-learned, but also took into account the new demands on our teaching. When we taught the material for several new live courses for Advanced level students on similar subjects, we also injected some of our Research level students, even those not physically present in another parallel (often individualized version) of the course materials. While this still is to a degree a known limitation in some ways, the advanced courses did have a larger draw than the previous Research level course itself and allows us to more appropriately use the hybrid model. This also meant that we had more control over some of the limiting factors, we had encounter during the pilots. Furthermore, as we continued to share our ideas and progress with our colleagues elsewhere around the world, some of them also started to employee more hybrid methodologies, which seemed to work better both technically and pedagogically according to some of our subsequent visits. Ultimately, with partners of the previous live course and some pilots, we have decided to contribute to the development of a MOOC, which we hope to have take off with the technical support of an experience and well-resource partner institution some time in 2018. This course can continue to be the springboard for our global health PhD students and help us to better utilize their limited time and resources when together in Umea, as well as reach a much larger group of students than our previous classroom course had.

- **RESULTAT-RESULTS**

Har ni uppnått de mål som var tänkt? Till vilken grad? Blev det ändringar/justeringar under projektets gång? - Have you achieved the objectives intended? To what extent? Were there changes / adjustments during the project?

As described above, we have reached some of our objectives, while others were adjusted to an extent. We may have gone into the project naïve of the scale of such an undertaking and the practical niche, which it would fill. We did achieve an in-depth survey of our previous courses' strengths and weaknesses which has been invaluable to the development of new course(s) and modules on Climate Change and Health in general in our Research Team as well as Research Methods teaching and learning more widely within the Unit. Furthermore, we distilled a core curriculum with add-on modules for a student-centered e-learning course as we set out to do. Resultant of many internal meeting and external partners' expertise, and several pilots, we created as we intended a clear blueprint of a flexible and rigorous online course. Where we had to make, changes were in the timelines, and roll-out of the full version of the course. We had to adjust to the changing priorities of our students and faculty, and role our portion of the course in a hybrid version rather than a purely online version. The hybrid version also seemed to work better for clarifications and deeper learning, whereas the online modules on methods still were less student active and advanced than we had hoped they would be. Furthermore, we learned from our pilots, that

without facilitation, some of the online learning exercises fell flat, were too easy for some, too hard for others, and ultimately frustrating students compared to the same exercise given with limited hybrid interactions—directly with an instructor. In terms of our quantitative objectives for the course, we can see it several ways, but we definitely reached more students and in their home settings through the development of this project, thanks to help from our international partners and co-funding for travel to preform pilots. Furthermore, the refined curriculum which too this course off the books and reverted the materials into several other courses, meant our overall course participation in live and hybrid version of teaching the climate change and health research methods materials, also reached many more student here in Umea, than it had during the previous five years, which we saw as a positive. In terms of sharing our knowledge, I think we have had a limited but positive outcome. We have had positive uptake of learning technology usage in the Unit's teaching practices, perhaps as result of our experiences. Furthermore, our team, our students, and our wider network of colleagues have certainly joined us in discussion of lesson learned from the development of student active e-learning modules. The dissemination of our experience describe this in more detail in subsequent sections.

- **PROCESSEN-PROCESS**

Erfarenheter från projektgenomförandet – både bra och dåliga! Experience of project implementation - both good and bad!

The project implementation has had many facets—technical and cultural, teaching and learning, a small and large teams, internal and external stakeholders and yes, each of these dimensions had experiences during the project implementation that were...both good and bad and/or perhaps more or less successful in achieving our goals. Technically, an e-learning course can be many things, just diving in and figuring out what worked well and what didn't was time consuming but often cathartic, as we found out, perhaps our e-learning modules can be short and very refined, even if our camera or microphone is simply a laptop or mobile phone. The technical landscape of e-learning was a learning curve, an ocean swim at times, but in practice, one can have very simply technical component or very complex ones and still achieve success if the learning activities are solid. The technology and fluency with technology and higher bandwidth video/audio etc. better learning platforms, etc. all can improve students' and teachers' experiences, especially when larger scale enrollment is desired, but the core is still the material itself and how students interact with it.

Culture matters too. So the technology advancements in much of the world during this project has been rapid, but much of teaching and learning culture has remained the same in some areas, while others the landscape has changed drastically. The willingness and comfort with different educational modalities (including e-learning) on both teachers' and learners' sides of the course is a culturally variable element of our project process experience. In some settings, student interaction with one another to produce knowledge and understanding is much more difficult than other settings, where it is quite easy to have students working together in groups to discern greater engagement with the materials.

Furthermore, some learning activities online depended on a same time different place, model where as other learning activities could be conducted by each student individually as his or her own pace. While we initially found, the recorded lecture version of e-learning activities helpful in producing materials, we had often created too large of files for some our students' internet connections, and streaming was even less viable in some low and middle income settings. Language too was a double edge sword, which prompted us already in the pilot to have (where possible) a native speaker facilitator using e-learning materials in a hybrid manner. Over the period of the project, the whole cyber-literacy landscape has changed, which luckily for our project means more of the early technical barriers are becoming less and less cumbersome for many students. Similarly, e-learning, at least in augmenting other teaching, has become more and more accepted into common practice within our Unit and our partners' institutions. Furthermore, the advent of MOOCs and our resource for self-directed learning available online and through the democratization of knowledge more generally has resulted in culture shift among some students in terms of their knowledge-base, skills, attitudes, and practices of self-tailoring their own education.

While we worked with a variety of stakeholders and teams in this project around the world, some of whom, we met in person only rarely, mostly we were implementing the course development and preliminary research with our much smaller Research (and teaching) Team on Climate and Health in Umea. Our goals for the course content in terms of training researchers matched better with some of the course materials we were developing than the goals of our wider partners' institutions as we sometimes learned when conducting pilot workshops. Often as we had suspected, students had diverse backgrounds, and sometimes very limited knowledge of climate change science or lacked some other fundamental content area expertise, and therefore we much less able to on-board environmental public health research techniques built on those foundations. For this reason, we spent more time developing and directly students before pilot to resources for fundamental of the subject matter so that we could better reach the desired depth of research level content the course had been designed to elucidate.

- **SPRIDNING-SPREAD**

Hur har ni/kommer ni att sprida information om projektet? How have you / will you disseminate information about the project?

This PUNKTUM project has sparked, and/or rather perhaps, reignited conversations about how we can better leverage available technologies in teaching and learning and better serve the needs of the international students and global projects which are at the cornerstone to graduate education in Epidemiology and Global Health. During the autumn of 2016, we planned to hold a dissemination event to facilitate a wider discussion of transitioning face to face courses to e-learning in the context of research education in public health with our Unit Teaching Team. For scheduling and delays in the full implementation of the e-learning only version of the course, we instead shared our experiences with teaching faculty of the Unit through our regular series of Teachers meetings and much more explicitly in meetings within our Research Theme on Climate and Health who were more engaged with e-learning

of this material. Among those responsible for planning and teaching courses, the project has also been a source for invigorating discussions involving rethinking how and what we plan to for students to learn from our course(s) and the timeline of such learning both in contact time and student time. In achieving our initial milestones within the PUNKTUM project and networking within local our Research Theme, Unit, and University, we saw 'soft' payoffs in the relationships between colleagues and attitudes toward student-centered e-learning at the research level. Perhaps as little surprise, with support of the Director of Teaching (a previous PUNKTUM Project Coordinator), during the last year, the Unit Teaching Team has further engaged in general with e-learning and had a multi-session workshop on the subject so that moving forward, we can better leverage student centered e-learning in our online-only, on-sight and residential student in the advanced and research courses we offer at Epidemiology and Global Health.

Throughout the PUNKTUM project period and the development of course models for the piloting project, our team became more and more aware of the potential utility of e-learning in our more traditional teaching of Advanced Level Public Health courses. Based on the time invested and resources discovered during the development of the e-learning Climate Change and Health Research Methods Course, we implemented with greater finesse flipped classroom and student centered methods for teaching in the Public Health Informatics and later the Health Environment and Sustainability Courses coordinated by our Climate and Health Research Team Faculty. Further goodwill created through the development of the course was spread to our international partner institutions in Europe, Vietnam, and Indonesia, (and later in the project Malaysia as well) in the form of our planning workshops and pilot modules implementation. The dissemination and total impact of these collaborations is still very much in process. However, we can report with delight that our conversations on a student-centered e-learning model has been further improved, re-engineered, and utilized in the local context at partner institutions for other courses with great success in subsequent research and teaching collaboration visits.

The series smaller disseminations which took place over a longer period from August 2016 until Summer 2017 also included significant discussion with our internationally based collaborators, pilot implementation faculty, and future partners culminating in a discussion the transferable lessons learned from the e-learning transition and project as a whole in late May 2017. This discussion of the way forward took place in partnership with our colleagues in the TropMed network from Heidelberg, Germany (among others), who have had a similar course goal over the years of the project to increase our courses' impact through student centered e-learning and ultimately the potential for transition to a Massive Online Open Course (MOOC) platform.

- **FRAMTIDEN-THE FUTURE**

Hur kommer resultaten att implementeras? Fortsatt utveckling? How will the results be implemented? Continued development?

The future of this PUNKTUM project is indeed bright. We have consolidated expertise within the Unit of Epidemiology and Global Health around the utilization of video and

online learning resources for traditional course through amplified usage of 'flipped classroom' methodologies in the wake of this project as well as increase capacity in student centered e-learning for course purely offered online. Specifically, within the education of public health research methods for climate and health issues, we have collaborated with partners in Europe and Southeast Asia to create several course models with the support of other co-funding sources. In partnership with Heidelberg University, our students at the advanced and research levels will (in 2018) have full access to a MOOC specifically on Climate Change and Health Research Methods, co-taught by research faculty from some of the world top experts in the field including the Umea Centre for Global Health Research (UmU-EpiGH), Heidelberg's Institute of Public Health, Potsdam Institute for Climate Research, and Harvard's T.H. Chan School of Public Health. The faculty involved even from other Universities have been involved in the Climate Change and Health Research Methods course for many years since it was offered in Umea and have been connected through current (or previous) research and teaching collaborations including several adjunct/guest professorships to Umea University's Faculty of Medicine. Through these extensive collaborations and this project, we have had the opportunity to expand the scope of the project even further in the future, while continuing to offer support to our students locally and across the globe. Hosting and technical support which was a great challenge and learning point throughout this project will be even easier in the future as student centered e-learning has come to age and access to technical support and an open online course platform can be achieved with decreasing capital and personnel commitments through our wide network of partnerships.

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