DREAM I.T.

DEVELOPMENT RESEARCH TO EMPOWER ALL MONGOLIANS THROUGH INFORMATION TECHNOLOGY

Helena Grunfeld and Maria Ng Lee Hoon, Editors

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Foreword

The DREAM I.T. - Development Research to Empower All Mongolians Through Information Technology - series of applied research projects that were conducted over five years, between 2009-2013, have been significant to Mongolia for the opportunities availed to researchers and development workers from many universities, government and non-governmental organizations, to freely explore the potential of ICTs to contribute to the country’s socio-economic development. This intensive action research program was timely, at the onset of the deployment of ICT infrastructure, including the Internet, to the wide expanses of Mongolia through wireless networks and mobile phones, and as the Government formulated information and communication technology (ICT) policies to bring universal access to people living in remote places.

The national collaboration fostered among researchers and development workers through the DREAM I.T. initiative built upon and indeed could not have been possible, without the efforts of those who had laid the foundation stones for ICT development in the country during the previous two decades. So, I would like to take this opportunity to pay tribute to those who contributed to our digital pioneering days, when we achieved partnership with the International Development Research Centre (IDRC) in ICTs for development in the early 1990s. Those were very memorable times for the group of us who led the way, soon after we metamorphosed from a government research and development agency to become Datacom. To launch the first Internet connection in Mongolia, we worked day and night, month after month, reading technical literature, studying and testing Internet technologies and connectivity software. Twenty years ago, we were working in isolation and struggled to learn from scratch, on how to transfer data from personal computers into routers, to connect to the email system via PCmail, a distributed mail system for personal computers. Today, our ICT4D work is internationally connected.
At that time, Mongolia was just on the verge of democratizing and opening up to the outside world. The Mongolian economy faced great challenges and we had no access to financial resources to realize our hopes to connect the country to the Internet. Many of the other Asian countries were gaining access to the Internet, some of them swiftly, while we had no means to acquire technical know-how and financial resources. We remember that one very lucky, undreamt of day in early June 1994, when Ms Maria Ng, representing the IDRC Singapore Office, knocked on our doors from out of the blue, to offer us external collaboration and probable solutions that we seized eagerly. And we have never looked back. She had made a solo long-distance trip from Singapore, after painstakingly gathering intelligence and using her intuition in seeking us out to become the first least developing country that IDRC would support to pioneer Internet connectivity in an unconnected place, still lacking relevant policies, e.g. for Internet service providers. Our long-term cooperation with IDRC in international development began from that day, progressing through the years and embracing each wave of new technologies. This collaboration continues to this day. Maria Ng came to be the person, who for us, represented the entire IDRC organization. Since that time, and until the completion of the DREAM I.T. project she assisted Datacom to spearhead several countrywide initiatives that enabled many organizations, agencies and Mongolia’s ICT sector personnel to conduct research. She also kept Mongolia abreast of ICT-related trends and changes.

DREAM I.T. is the latest IDRC-supported mega project implemented over the last five years. Designed as a holistic country project, it has posited ICT research and innovation, socio-economic impact and policy formulation as inseparable dimensions of development. DREAM I.T. provided financial grants, enabling many government and non-government organizations, universities, private companies, communities and individuals to conduct ICT research and pilot field applications; it built capacity and skills on many fronts, ranging from technical to management and included sociological analysis, making it possible for many Mongolians to act on their inspirations, ideas and hypotheses. In this book, the reader is introduced to these projects, their research papers and recommendations.

I am very pleased that like many initiatives we started since the early 1990s, the DREAM I.T. series of projects have had positive impacts on the livelihoods of many Mongolians. DREAM I.T. has successfully concluded, with solid outcomes, including the Government paying due attention to many of the recommendations from its projects. In the field of education, for example, we have gone from the development and use of TV and video-based educational materials, to raising awareness about the concept of open educational resources (OER), building capacity to test and adapt global practice models and establishing initial policy structures such as a Mongolia CC affiliate, achieved in May 2013. My vision of an Open Network for Education – ONE Mongolia, is now taking shape. As well, discussions on how to collaborate to establish an enabling legal environment and sustainable financing methods have started. All these developments have been highly praised by the public and the international community. These are signs that DREAM I.T. has come a long way in meeting its intentions.

Mongolia’s key development sectors, including its ICT sector, are rapidly developing and changing. The DREAM I.T. project, its management and staff, researchers and partners have been actively engaged in this dynamic shift, guided by their objectives and dreams. Therefore, taking this opportunity, I would like to express my sincere gratitude to the many who have supported our dream. Also, on behalf of the participants in the DREAM I.T. projects, I take this opportunity to gratefully acknowledge IDRC’s sustaining support and commitment. I know that we will continue to Dream IT and Make IT.

Enkhbat Dangaasuren
Preface

In late-2000, with the consolidation of Internet access in urban areas, its accelerated extension to rural areas and the start of rapid proliferation of mobile phones throughout the country, Mongolian researchers and development workers began to see new opportunities that set them thinking about how a knowledge society could benefit socio-economic development in the country. A core group of stakeholders began planning to conduct applied research and pilot applications with information and communication technologies (ICTs) to solve problems of critical importance in agriculture, health care, the environment, education and governance, especially for people living in remote places. They spoke of their ideas as wishful thinking, or “dreaming”, given the limited experience in the country in development research and their realization that research capacity would have to be built along the way. Hence, the project was given the name, DREAM I.T. which is an acronym for Development Research to Empower All Mongolians Through Information and Communication Technologies. This captivating project name is also used for the title of this book, encouraging readers to think of the potentially empowering influences of ICT for development (ICT4D) initiatives. They wanted to contribute, visibly and concertedly to the development of their country by testing, learning and telling, with the hope of influencing policy, so that they might positively impact on both the ICT and socio-economic landscapes. From this vision, a large umbrella applied research project was defined for a series of ICT research project interventions related to:

- Applied research (piloting innovations to test ICT-supported solutions for critical developmental issues);
- Socio-economic impact research (understanding how those targeted by the projects would be affected by the new project interventions); and
- Policy research (building evidence from applied research and pilots and promoting dialogue with decision makers to inform policy making).

Development of the project ideas began in 2007, with a scoping study to prepare an inventory of ICT policies and programs in the country and key Mongolian institutions and actors working in the ICT4D area. The main stakeholders of the project visited many parts of rural Mongolia to assess needs and challenges at the aimag and bag levels and were invited on study tours to learn about the ICT4D environments in Canada and the Philippines. Based on this acquired background information, they organized and launched several rounds of competitive calls for proposals from Mongolian academia, government agencies, private and civil society organizations in the thematic areas. This series of events evolved into the DREAM I.T. project.

The DREAM I.T. umbrella project comprised a package of subprojects, reviewed and selected from proposals that were submitted through open calls extended to state, academic, business and civil society organizations. The researchers were invited to submit proposals on what they considered critical development issues and solutions that they wished to test. The umbrella project was coordinated by Datacom using this private company’s ability to coordinate and manage projects and disburse funds in a multi-stakeholder undertaking. DREAM I.T. was led by Dr Enkhbat Dangaasuren, a well-respected Mongolian leader and had a board and an executive project team responsible for coordinating and mentoring the subprojects. This involved bringing together the subproject research personnel from different organizations in Mongolia, as a network, facilitating the necessary resources to provide capacity-building in research management and methods, evaluation and dissemination of
research results. The International Development Research Centre of (IDRC) Canada, funded the DREAM I.T. project and supported it technically, from June 2007 until July 2012. Some of the subproject research papers have been individually published elsewhere, but this collection of subprojects manifests the quest of the DREAM I.T. project stakeholders to disseminate widely, the learning and outcomes of the key research and development efforts. It is also a legacy publication to tell an illustrated story to the Mongolian public and the global community of the trend-setting work that Mongolian ICT4D academics, public institutions and civil society have achieved for the country.

It can be seen from this collection of applied research projects that there was concern on the part of the researchers with inclusive development, to address the needs of people living in remote areas, and this in itself might contain lessons for other countries that are undergoing transformation. The pioneering initiatives showcased through the ten chapters in this book, draw together contributions representing a broad spectrum of ICT projects from three domains. They show how the imagination and creativity of people applying innovative uses of ICTs in different fields have contributed to addressing equitable participation, which in Mongolia has particular challenges related to poor infrastructure, extreme climatic conditions, environmental degradation and a dispersed rural population. The chapters raise awareness of how ICTs can facilitate improvements in many aspects of life in a country emerging from a state controlled society to one that is increasingly embracing open development. They raise important issues concerning the responsibilities and roles of stakeholders in society and about the relationships between individuals, communities, non-government organizations and the state. The case studies used a range of frameworks, methodologies and methods, some more rigorous than others. By including issues and challenges faced, readers can follow the frustrations sometimes encountered when conducting research in developing countries and emerging economies. Readers also get an opportunity to listen to the voices of Mongolian herders, not often heard beyond the borders of this country. The chapters, arranged in three parts: governance, education and livelihoods, give the readers insights into how ICTs can contribute to improved livelihoods, especially of communities that are remote and dispersed across a vast terrain. The book thus contributes to the growing body of evidence showing how appropriate ICTs can be used to promote development, by unleashing creativity and ingenuity.

Part I - Governance

Part I, which deals with governance, starts with an overview of the ICT environment in Mongolia: past, present and emerging developments. With the increasing prevalence of ICTs in the Mongolian society, the chapter illustrates how the legal and regulatory environment has been adapting to technological changes and new applications. It also outlines the responsibilities and roles of the two government agencies responsible for policy making and regulation of this sector: The Information Technology, Post and Telecommunications Authority of Mongolia (ITPTA) and the Communications Regulatory Commission (CRC), respectively. The section on industry structure, infrastructure and services presents some of the challenges involved in servicing a country of low population density and difficult terrain and points out potential opportunities arising from Mongolia’s location on the shortest practical cable route between East Asia and the financial centres of Europe. The author argues that the deployment of this fibre route, for which there is much interest, has the potential of bringing significant investments to the Mongolian ICT sector. The chapter includes a section on donor-assisted ICT projects and particularly of the sustained contribution of IDRC, whose ICT4D development research investments in Mongolia have spawned this book.
Drawing on work by infoDev and the Center for Democracy and Technology, which classified e-governance into three phases: publishing, interacting and transacting, the second chapter introduces readers to a project aimed at enhancing public participation in the parliamentary processes via the Mongolian Parliament website. It reports on a project that started with analyzing the extent to which the Parliament website of the Mongolian Government had evolved to keep pace with the evolution of the Internet. At the time of their study, the website was transitioning from the publishing to the interactive stage. An important aspect of government websites is the extent to which they are used and the first phase of the research explored this issue. The researchers were interested in understanding who used the website of the Mongolian Parliament, what information and other resources the users sought, whether they were successful in finding what they were looking for and if there was demand for a more interactive website. The initial research phase incorporated consultations with a wide range of stakeholders, who provided important insights into how the relationships between the individuals and their elected representatives could be improved with a more interactive website. A very valuable outcome of this project was that the policy recommendations developed by the research team, founded on the research results, were communicated to relevant policy and decision makers, who then agreed on the proposed revamp of the website as well as new procedures to manage it. The enhanced website facilitated communication of information and feedback between parliamentarians and the public. This was of particular benefit to isolated, remote communities, especially during the winter months. These practical outcomes were no doubt facilitated by the active involvement of staff from the Secretariat of the Parliament. However, as the authors highlight in their conclusion and recommendations, there was still much room for improvement to ensure that feedback mobilized through the website could be tracked and seriously considered by parliamentarians.

The last chapter in Part I deals with another aspect of e-governance, namely the deployment of ICTs to deliver government administrative information services by the civil service and their usage by the public. The Academy of Management together with the Cabinet Secretariat of Mongolia conducted a research project in which a questionnaire was administered to 1,200 citizens, seeking their views on the adequacy of government information and content available through ICTs. Interviews were also held with civil servants and decision makers in some ministries. The responses of the civil servants differed from the opinions expressed in the user survey, which found the government websites were not regularly updated, not fully operational and did not contain relevant information. The researchers also uncovered that the ability of civil servants to perform these tasks was directly linked to their ICT knowledge and the available ICT tools in their offices and recommended measures to improve the provision of government information services to the public. These were presented at a forum, attended by officials from various ministries, the Cabinet Secretariat and representatives from offices of local governors.

Part II - Education

In Part II, chapters 4-7, educational issues are explored from three levels of education: preschool and lower primary; secondary and tertiary education. Chapter 4 examines how parents and teachers were assisted with developing curricula for preschool and lower primary children, by reusing freely available open educational resources (OER), a concept that is fairly new to Mongolia. Chapter 5 charts the evolution of OER adoption in the country, culminating in the signing of the Creative Commons Mongolia Affiliate Memorandum of Understanding (MOU). Chapter 6 looks at how educational television, an established technology, was blended
with newer technologies, the Internet and mobile phones to enable interactive distance learning for lower secondary school children living in remote aimags. Chapter 7 investigates issues associated with teaching of compulsory ICT subjects at the tertiary level. Each chapter shows how innovative approaches were embraced by students, teachers, parents and policymakers, the latter particularly in the case of chapter 7.

The first of the educational chapters deals with OER, a relatively recent phenomenon, particularly for early-age education, so the authors are filling an important knowledge gap, not only in introducing a relatively new way of producing and using learning material, but also with respect to the design, localization and reuse of such resources in Mongolia. Another unique aspect of the project was that the OER was intended for children, parents and teachers alike. The case study presented by the authors describes a project conducted by the Mongolian non-government organization (NGO), Education Wave. It identified suitable OER material for reuse and designed local curriculum materials that they shared through a Creative Commons licence. The objective of the project was to improve the knowledge and abilities of parents and teachers to work with children up to the age of eight, with specific emphasis on understanding under what conditions teachers would adopt and/or adapt OER and whether parents and teachers would collaborate in improving such resources. Awareness raising and capacity-building became important components of the project, as there was not even a legal framework, such as a Mongolia Creative Commons Affiliate to promote the OER concept, when the project started. Using a multi-phase design-based research approach with iterations between design, development and implementation, the project studied practice impacts on parents and teachers when creating and using OER materials both of Mongolian origin and other material that was localized for this project. The project started with a baseline survey that identified challenges faced by parents and teachers when working with early age children. One of the important baseline study findings was that the dominant educational practice was teacher-centric, presenting a challenge for the introduction of OER. Interestingly, teachers and parents nevertheless showed desire to gain new knowledge in this field, found the experience of working with OER stimulating and would like to see it given a prominent place in the education system. The findings of this research would be relevant for educators and policy makers in other countries that are at early stages of OER development and those considering a transition to more student-centred learning approaches. Looking ahead, the authors recommended a national website for OER. Such a site would go a long way to freeing up information and learning resources that would otherwise require greater effort to create and access without necessarily benefitting as many users. With the increasing use of the Internet in Mongolia, such a website holds much promise for making education more cost-effective and learning a more dynamic activity.

A “national website for OER”, as recommended in the OER case study chapter introduced above, has indeed been built, and just in time to enable its announcement to be included in this book. Aptly named Mongolia’s Educational Resources go into the Great Wide Open, chapter 5 describes the process towards opening access to educational materials, making them available for use, reuse and repurposing in the country and beyond. Under a vision of an Open Network for Education (ONE Mongolia) conceptualized by Dr Enkhbat Dangaasuren, two initial initiatives, ONE Academy and ONE Student websites, have been created by the ONE Mongolia project team. ONE Academy, containing Mongolian streaming video resources, is the start-up of a national website for OER, while ONE Student provides Google Apps classroom tools and other open resources to facilitate collaboration. Materials on these websites are licensed under a Creative Commons Attribution Share-Alike licence (CC-BY-SA). Both were launched at the third national seminar held jointly with the Institute of Teachers’ Professional
Development of the Ministry of Education, Culture and Science at the end of May 2013. It was at this seminar that the ONE-Mongolia team signed the MOU to become a Creative Commons Affiliate in conjunction with the launch of the Mongolia Affiliate website. ONE Mongolia is envisaged as an evolving umbrella, growing as many different components as creativity and funding resources permit.

The next chapter dealing with education analyzes a pilot project involving distance education for secondary schools. It provides interesting background to the evolution of the educational system in Mongolia, following the country’s socio-economic transition from the early 1990s, including experimentation with different forms of non-formal education. The Blended Technology Education Program, BTEP, described in this chapter, was piloted by the Education Channel of Television of Mongolia. While blended learning, which combines online with face-to-face learning, is quite common in tertiary education, this is not the case at the secondary level. That makes experiences from this pilot applicable beyond Mongolia, as it illustrates how students can benefit from the knowledge and teaching approaches of the best teachers, regardless of their or the teachers’ locations. BTEP tested a distance education method that combined three technologies: television, the Internet (using 20-25 desktops at computer labs in each participating school) and mobile phones. The trial consisted of English language teaching to a group of students in grade 8 and computer education to a group in grade 10. Both subjects were taught in one rural and one urban school in Ulaanbaatar to students of what the author refers to as families with average living standards; the rural students were from families with a slightly higher standard of living than their urban counterparts. But the urban students tended to have better access to ICTs, as they could also use Internet cafes, an option not available to rural students. The research used mixed methods. In addition to the baseline and three subject knowledge tests measuring learning outcomes, the research included questionnaires, focus group discussions and interviews with a randomly selected sample to obtain data on subjective factors, such as satisfaction. Comparisons were also made with control groups in both subjects and at both settings. The comparison between the final results and the baseline showed an increase in A (highest) to D scores and a sharp decrease in F (lowest) scores. An interesting feature of the research was that there was a tendency of students to overestimate their knowledge at a self-assessment process at the baseline stage. In self-assessments at the end of the course, the authors noted that several students claimed that their independent learning skills, concentration and abilities to challenge and demand more of themselves increased. This experiment indicated that blended learning can be successful for different subjects in both urban and rural settings and can also improve generic learning skills, subject to adequate infrastructure, logistical support and above all, motivated facilitators. This chapter thus contributes to the general body of knowledge in distance education.

It is not often that recommendations from research leads to policy changes, but the project in chapter 7 did just that, as illustrated by the inclusion of a copy of the Ministerial Decree that promulgated the recommendations from this research project. The objective of the recommendations was to better position tertiary students for further studies and employment, by improving their informatics skills. The authors stress the importance of ICT training objectives extending beyond students learning how to use computers and to also incorporate awareness, knowledge and skills on integrating such use into everyday living, as an integral part of their livelihoods. The recommendations were informed by research that explored ICT education in secondary schools and tertiary institutions, comparing the curricula, contents and teaching methods of informatics taught at the secondary school level with the compulsory ICT subjects taught at the tertiary level. In conducting the study, the research team analyzed the informatics curricula at both educational levels and administered questionnaires on
ICT knowledge to tertiary students. A key finding was that, while many secondary students benefited from a national standard for informatics, there was no similar standard at the tertiary level. The reason for not all secondary students benefitting from the informatics standard was that many schools did not fully comply with it and the standard was not enforced. Another important finding was that there were no linkages between the informatics curriculum standard at the secondary level and the compulsory ICT training at the tertiary level. To remedy these issues, the project team recommended that teaching of informatics at the secondary level comply fully with the standard and that the compulsory ICT training at the tertiary level become a direct continuation of that curriculum and be based on international standards. They also recommended that universities incorporate ICTs in the teaching of other disciplines, thereby linking relevant ICT education with other subjects. The approach to curriculum assessment advanced in this chapter could be adopted in other countries and for other subjects, making its contribution even more wide-reaching.

Part III - Livelihoods

Part III explores different ways in which ICTs have been used to improve livelihoods in general and the last chapter on health in particular. Although chapters 8 and 9 examine projects that give the readers interesting insights into traditional Mongolian lifestyles, the findings have much wider application, as has the last chapter, which is an account of a project that deployed ICTs to address the mental health of stressed professionals. The chapters illustrate how ICTs can be adapted to fit into existing lifestyles, while at the same time showing that these are not static.

The opening chapter in Part III deals with a pilot of a local weather forecasting system, which although reflecting the uniqueness of Mongolia, has relevance for other countries with extreme temperatures, where livelihoods are weather-dependent. The weather system described in this chapter was designed to respond to the demand for more timely and accurate localized weather forecasts to reduce the risks of livestock dying and improve planning of key livelihood activities. Emphasizing the importance of weather forecasts, the project started with a needs assessment, which found that the top priority of herders was to obtain three day weather forecasts for temperature, precipitation and wind speed. The needs assessment captured the annual life-cycle practices of herder families. In a list of herder activities over an annual cycle, the readers are given an insight into the unique Mongolian nomadic lifestyle. This list was developed through community participation, a theme that runs throughout this chapter, illustrating how the local herders were information providers as well as information receivers with respect to weather information. Community participation was facilitated by the involvement of the Mongolian NGO, Environment and Development Association (JASIL), which had previous experience in co-management through which herder groups collaborate with government agencies to manage natural resources more effectively.

In reviewing the outcomes through discussion with community members, the authors found that herders appreciated the improved pasture management practices enabled by the new weather forecasting systems, which they integrated into existing weather observation practices, informed by their local knowledge of factors such as landscape colours and animal behaviour. Although the winter following the introduction of this system was not as harsh as the preceding winter, herders attributed the very high livestock survival rate to the weather forecasting system. The chapter contributes to the body of knowledge on how innovative ICT applications can improve livelihoods, highlighting the importance of partnerships between local communities and subject matter experts, such as meteorologists, government agencies
and NGOs particularly where there is mutual respect for different types of knowledge, whether generated by scientific methods or acquired over generations in local areas. The chapter also demonstrates the importance of repurposing available technologies and services in creative ways, blending the latest technologies with the traditional way of relaying information from herder to herder on horseback, particularly where the terrain and extreme weather conditions sometimes present profound challenges for modern technologies.

In the chapter describing the information system *My Homeland*, the authors bring to this book a timely discussion on mining, juxtaposing the benefits of this sector in terms of providing employment and development opportunities with the adverse environmental impacts. Some of the mining developments are contested by herders, as there are potential negative social impacts accompanying these developments, with herders concerned about how mining can affect their livelihoods and traditional lifestyles. Noting the difficulties faced by herders in finding a common and strong voice because of their dispersed and loosely organized structures, the initiators of the *My Homeland* project suggested that ICTs could play an important role in reducing problems and forestalling confrontations between different stakeholders in mining areas. They wanted to test whether dialogue via ICTs would be a productive way in which the three stakeholder groups identified—herders, mining companies and local governments—could reach a common understanding. The authors developed an information system designed for multi-stakeholder collaboration and grievance management to avoid conflicts, as a pilot in the Emgenbulag bag of Nomgon sum. A striking feature of this sum is that 58% of pasture land was leased to 34 companies for mineral exploration and mining. In addition to developing a prototype system for *My Homeland*, operated from a computer lab in a local school and using refurbished hardware and open source software, the project included local capacity-building and institutionalization of the information system as well as baseline and evaluation research. The research outcomes informed the system design, which was based on understanding the motivations, perceived opportunities and threats associated with mining from the perspectives of the different stakeholders. The establishment of what the authors refer to as a collaboratively managed grievance mechanism is of practical value and considerable relevance in countries where mining is extended into pristine areas, affecting traditional lifestyles and livelihoods, as it can be used as a model for collaboration and achievement of a common understanding between stakeholders.

The final chapter in the book, dealing with online counselling of stressed health professionals, addresses an issue of interest to developed and developing countries alike, as work-related stress is a global phenomenon. Online counselling, using various technologies, has been practised in several countries and the authors provide a brief overview of the literature in this area. But online counselling is a greater challenge in an environment of low levels of Internet access, use and digital literacy—constraints that might have influenced the outcomes of the trial presented in this chapter. The purpose of the trial was to compare the effectiveness of online counselling conducted via synchronous chat with face-to-face counselling, using cognitive behavioural therapy, a common method in computer-mediated counselling. It was a randomized controlled trial among doctors and nurses who had been diagnosed with depression, burnout and/or anxiety, using standard survey forms commonly used for diagnosing these conditions. Altogether, 212 participants from nine hospitals were invited to participate in the trial, which ended up with a total of 21, who completed the interventions: 11 online and 10 face-to-face, as well as 14 in the control group. The project started with a half-day training session to which all participants, including those in the control group, were invited. A customized portal, with dynamically generated web pages and a special chat module, was designed for the online trial, using proprietary coding to ensure security and
confidentiality. The researchers did not find any noticeable differences between the two intervention groups in the extent to which the symptoms of depression, personal burnout and anxiety levels were reduced. Although the online counselling required on average 14 minutes more per session than face-to-face counselling, the authors point to the benefits of reaching remote areas and the greater potential for anonymity it confers. The success of the online trial heralds opportunities to extend counselling to remote locations, not only in Mongolia, but also to other developing countries where online counselling can be deployed to address conditions for which cognitive behavioural therapy is an appropriate treatment. This chapter can contribute to forming an understanding of the implementation of such a system.

Helena Grunfeld and Maria Ng Lee Hoon
Contributors

The Mongolian authors are listed in alphabetical order by their given names and not by their family names, in order to reflect the Mongolian tradition of writing and addressing by given names.

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Ariunsanaa Bagaajav has been a senior lecturer at the Department of Social Sciences and Humanities, Health Sciences University of Mongolia, since 2004. Her research interest areas include non-communicable diseases and social work practices at health settings. She also engages with curriculum development and course design.

Batbold Zagdragchaa, as a staff of Datacom Co. Ltd., has served as the DREAM I.T. project leader during the entire project period and he was responsible for its technical reports. He was generally responsible for research content, quality and methods. He facilitated communications, networking, collaboration and gender sensitivity activities among the project stakeholders. His research interests are open educational resources, open government and ICT use in different socio-economic sectors. He holds a master in international and development economics from the University of Namur, Belgium.

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Her career focus has been on educational media, including how to better use media for the purpose of education and awareness raising, especially at the time of social transformation. Currently on a PhD program at the University of Pittsburgh, she is also contributing to efforts at its Institute for International Studies in Education through grant writing, fund raising, editing and other administrative tasks.

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David Porter is the executive director of BCcampus in British Columbia, Canada and a long-time advocate for the benefits of adapting new technologies to deliver educational opportunities. His experience in the education and training fields has included working with both public and private sector organizations in Canada. He has also been a project manager for industry-based projects in Canada and the US. He has worked as a project leader and consultant for international distance education projects, most recently in Mongolia, Malaysia, Vietnam and India. His research interest is educational program design for open and distance learning. He has also been a forceful advocate for the use of open educational resources (OER) and most recently, was co-editor of *Open Educational Resources: An Asian Perspective,* published by the Commonwealth of Learning, under its Perspectives on Open and Distance Learning series.

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Ykhanbai Hijaba, ScD, is currently director of the Environment and Development Association, JASIL, which has been a member of the International Land Coalition since 2011. He has 20 years of work experience in the management of natural resources, and more than 12 years working with participatory research methodologies. His doctoral work in 2008 was on “Economic incentives and regulatory instruments for forest and pasture management” at the Forest Engineering Academy, St Petersburg, Russia. He has worked as a specialist, director of the Department of Strategic Management and Planning and as advisor to the Minister for Nature and Environment, Mongolia. He was the research team leader of an IDRC-supported project on Collaborative learning for the co-management of natural resources in Mongolia for several years.
Acronyms

ACM     Association of Computing Machinery
ADB     Asian Development Bank
ANOVA   Analysis of Variance
BCcampus British Columbia Campus
BTEP    Blended Technology Education Program
CBT     Cognitive Behavioural Therapy
CC      Creative Commons
CC BY-NC-SA Creative Commons - Attribution-NonCommercial-ShareAlike
CD      Compact Disc
CESD    Center for Epidemiologic Studies Depression
CDMA    Code Division Multiple Access
CMC     Computer-Mediated Counselling
CMM     Capability Maturity Model
CRC     Communications Regulatory Commission
DANIDA  Danish International Development Agency
DBR     Design-Based Research
DREAM I.T. Development Research to Empower All Mongolians Through Information Technology
3G      Third Generation mobile telecommunications technology
GDP     Gross Domestic Product
Gbps    Gigabits per second
GPRS    General Packet Radio Service
GSM     Global System for Mobile Communications
ICMM    International Council on Mining and Metals
ICT/s   Information and Communication Technology/ies
ICT4D   Information and Communication Technology for Development
ICTPA   Information Communications Technology and Post Authority of Mongolia
IDRC    International Development Research Centre, Canada
IEEE    Institute of Electrical and Electronics Engineers
IFC     International Finance Corporation
IFIP    International Federation for Information Processing
ISTE    International Society for Technology in Education
ITPTA   Information Technology, Post and Telecommunications Authority of Mongolia
ITU     International Telecommunication Union
JASIL   Environment and Development Association
KOICA   Korea International Cooperation Agency
MASM    Mongolian Agency for Standardization and Metrology
DREAM I.T.

Mbps  Megabits per second
MEA   Mongolian Education Alliance
MECS  Ministry of Education, Culture and Science
MIGA  Multilateral Investment Guarantee Agency
MNCSM Mongolian National Center for Standardization and Metrology
MoH   Ministry of Health
MoU   Memorandum of Understanding
MPs   Members of Parliament
MRA   Mineral Resources Authority of Mongolia
NAMEM National Agency for Meteorology and Environmental Monitoring
NGO   Non-Government Organization
NSO   National Statistical Office
OBG   Oxford Business Group
OER   Open Educational Resources
ONE   Open Network for Education
OpenEMIS Open Education Management Information System
RIMES Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
SCIT/MSUE School of Computer and Information Technology/Mongolian State University of Education
SIM   Subscriber Identity Module
SME   Small and Medium-Sized Enterprise
SMS   Short Message Service
SPSS  Statistical Package for the Social Sciences
STAI  State-Trait Anxiety Inventory
UB    Ulaanbaatar
UNDP  United Nations Development Programme
UNESCO United Nations Educational, Scientific and Cultural Organization
USD   United States Dollar
USOF  Universal Service Obligation Fund
UUCP  Unix-to-Unix copy protocol
VCD   Video Compact Disk
WFD   Weather Forecast Data
xDSDL all types of Digital Subscriber Lines
### Mongolian Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Aimag</td>
<td>The first-level administrative subdivision. The country currently has 21 aimags. Ulaanbaatar, the capital city is administrated as an independent municipality.</td>
</tr>
<tr>
<td>Bag</td>
<td>Each sum is subdivided into bags, the third-level administrative subdivision. Bags are administrative units under which nomadic families without permanent habitats are grouped for the purpose of obtaining government services.</td>
</tr>
<tr>
<td>Dornogovi</td>
<td>East Gobi</td>
</tr>
<tr>
<td>Dzud</td>
<td>An extremely harsh winter, during which livestock cannot find fodder through the deep snow cover, leading to high animal mortality due to starvation and the cold.</td>
</tr>
<tr>
<td>Ger</td>
<td>A round tent-like traditional dwelling of Mongolian nomads, made from a wooden frame and covered by wool felt.</td>
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<tr>
<td>Govi</td>
<td>Gobi</td>
</tr>
<tr>
<td>Khural</td>
<td>Parliament</td>
</tr>
<tr>
<td>Sum</td>
<td>The second-level administrative subdivision of Mongolia. The 21 aimags of Mongolia are divided into approximately 330 sums.</td>
</tr>
<tr>
<td>Tugrik</td>
<td>The basic monetary unit of Mongolia.</td>
</tr>
<tr>
<td>Umnugovi</td>
<td>South Gobi</td>
</tr>
</tbody>
</table>
An Overview of the ICT Environment in Mongolia

Batbold Zagdragchaa

Recent developments

The role of information and communication technologies (ICTs) in Mongolia’s development efforts is increasing dramatically, with total revenues from the industry reaching 471 billion Mongolian tugriks (USD 367.38 million) in 2010, up from 140.4 billion (USD 109.51 million) in 2005 (OBG, 2013).

Government initiatives and the expanding economy have seen the number of Internet subscribers grow from 17,400 in 2007 to 200,000 in 2010 and to 458,000 in 2011 (OBG, 2013). Increased access and a proliferation of Internet cafes nationwide have also spurred an explosion in the use of social networking websites. As of April 2013, the country was home to more than 600,000 Facebook users (Socialbakers, 2013).

Mongolia’s ICT plans include a number of initiatives in the health sector for hospitals to offer online appointment systems and a national system for early warning of infectious diseases to be implemented at the National Centre for Communicable Diseases. Ulaanbaatar is also planning an emergency management information system and an intelligent transport system using an integrated circuit card. In addition, land and properties are being registered in a geographical information system. This initiative is funded by the Millennium Challenge Account. To extend ICT availability across the country’s vast territory, the government plans to launch a communications satellite by 2015.

In e-governance, Mongolia was ranked number 73 of 190 countries in the 2012 United Nations E-Government Survey (UN, 2012). The country plans to implement an e-procurement system, which is being developed with support from the Korea International Cooperation Agency (KOICA), the World Bank and the Asian Development Bank (ADB). The project aims to have all government procurements go through an e-shopping and e-bidding system when completed by the end of 2013. This e-bidding system will increase transparency and efficiency.
The Secretariat of the Parliament of Mongolia has received a grant from the Korean Government through KOICA to develop an e-Parliament system for 2013-2015. The project objectives are to establish a data centre, to renew software programs, camera systems and to train the Parliament secretariat staff. The Korean Government has also committed to supporting the Office of Immigration, Naturalization and Foreign Citizens of Mongolia to implement an e-immigration system for 2013-2015, to help the country meet international standards for registering foreign nationals and improving the control system, legal environment and organizational structure.

Legal and regulatory environment

The ICT environment in Mongolia is governed by a number of legal instruments, including:

- Law on Communications (approved in 1995; revised in 2001 and amended in 2003, 2005 and 2008);
- Law on Radio Wave (approved in 1999 and amended in 2001);
- Law on Post (approved in 2003 and amended in 2005 and 2007);
- Law on Licensing Business Activities (approved in 2001); and
- Law on Government’s Special Fund (approved in 2006 to implement the Universal Service Obligation Fund - USOF).

Other relevant policy documents and programs include:

- E-Mongolia National Program, 2005;
- National program to establish unified information and registration system, 2008;
- National program to ensure information security, 2010; and

Main government authorities responsible for ICTs

There are two key ICT government organizations for policy making and regulation in Mongolia: the Information Technology, Post and Telecommunications Authority of Mongolia (ITPTA), and the Communications Regulatory Commission (CRC).

Information Technology, Post and Telecommunications Authority of Mongolia

ITPTA’s (http://www.itpta.gov.mn) mandate is to formulate laws, regulations and development policies related to information technology, postal services, broadcasting, telecommunications and technology development matters within the framework established by the Prime Minister’s Office. It is also responsible for the development of a unified registration system, organization of activities to implement policies, programs and plans, coordination, monitoring and evaluation.

USOF had subsidized ICT services in rural and remote areas by USD 8 million by 2010, including extension of Internet-enabled mobile networks and fibre optic networks. This was funded by a 2% levy applied to the net revenue before taxes on all service providers in the ICT sector. Some of the rural ICT development projects implemented by ITPTA include:

- Increase in the capacity of the radio and television network to provide access to more channels by the rural population;
- Access to Internet services for rural and remote sums; and
- Projects to improve mobile service coverage – towers were built in 17 sums, mobile
telecentres were piloted, mobile services were delivered to 6 border areas and settlements, etc. (ICTPA, 2011).

Communications Regulatory Commission

CRC ([http://www.crc.gov.mn](http://www.crc.gov.mn)) is in charge of regulating and supervising a wide range of areas, including competition issues, the provision of networks and services for fixed line and wireless telecommunications, television and radio broadcasting, satellite transmission, spectrum management, postal services and the Internet, to ensure that the public interest is well served (ICTPA, 2011).

The main objectives of CRC are to:

- Facilitate access to safe, reliable and affordable ICT networks and services by pursuing, where appropriate, a commercially viable and competitive environment;
- Support innovation and expansion of the ICT (including telecommunications) and postal markets, by efficient and impartial oversight of network and service providers and enforcement of their obligations;
- Protect the interests of users of networks and services in the sectors it regulates;
- Increase teledensity and access to ICTs across the country at affordable prices;
- Establish and maintain an interconnection regime that allows fair, transparent, prompt and equitable interconnection;
- Re-balance tariffs so that the objectives of affordability and operator viability are met in a consistent manner;
- Protect the interests of consumers and address general consumer concerns relating to matters such as availability, pricing and quality of service;
- Monitor the quality of services provided by the various operators, including numbering and spectrum resources; and
- Develop sector standards.

Industry structure, infrastructure and services

Four mobile network operators in Mongolia, provide services to over 2,940,000 subscribers (ICTPA, 2012), so the penetration rate of mobile phones is more than 100% of the country’s population of 2.9 million. There was a 17.2 % increase in SIM cards between 2010-2012, resulting in an average of 2.9 SIM cards per subscriber. Two mobile service providers (Mobicom and Unitel) deploy the GSM system and the other two operators (Skytel and G-Mobile) deploy the CDMA system. The market shares of each provider are Mobicom 42.9%, Unitel 21.2%, Skytel 19.7%, and G-Mobile 16.2% (OBG, 2013).

The prices for mobile communications have been reduced more than twice since 2006. At the end of 2010, the average price for a one-minute call with a mobile operator was USD 0.045. Mongolia was placed 91st among 161 countries (i.e. prices in 70 countries were higher than those in Mongolia), where prices were lower than the Asian average (ITU, 2010).

Since 2009, Mobicom, Skytel and Unitel have launched 3G high-speed mobile broadband services in Mongolia, offering new services to customers, such as video calls, mobile broadband with high speed connections through mobile phones or special modems for screening TV programs. By 2011, the 3G services were offered in 31 sums and settlements, reaching over 171,000 users (ICTPA, 2011). Mobile banking is widespread in the country and herders have access to it.
As of the end of 2011, the country had 1,400 km digital microwave links. Also helping Mongolians connect was a 13,000 km national fibre optic network, linking all 21 aimag centres and over 160 sums. There were over 70 Internet service providers, which shared 11.2 Gbps bandwidth and provided a range of access methods, including xDSL, fibre optic, 3G, and GPRS connections. There were plans to connect another 140 sums by the end of 2013 (ICTPA, 2011).

Internet speeds are high, with near zero latency. In tests done by Ookla, a broadband performance testing company based in Seattle, Mongolia’s download speed was clocked at 11.89 Mbps at the end of 2012. The country was ranked as number 46 globally in terms of download speeds, ahead of Thailand, Malaysia, Indonesia, China and Vietnam (OBG, 2013).

By virtue of its geographical location, Mongolia is on the shortest practical cable route between East Asia, particularly Hong Kong and the financial capitals of Europe. Indeed, the Hong Kong-Beijing-Ulaanbaatar-Moscow-London corridor is being actively developed by service providers seeking to reduce the time it takes for banks, brokerages and law firms to communicate with stock exchanges, clients, branches and other institutions. The growing interest in this option could result in significant investments in Mongolia’s IT sector.
ICTs for development

The International Development Research Centre (IDRC) of Canada has been involved in building capacity in ICT-supported development research and assisting institutions to pilot ICT development projects in Mongolia from as early as 1994. The initial project provided seed funding for Internet infrastructure, field-testing Unix-to-Unix copy protocol (UUCP) dial-up connectivity. Those times spurred the emergence of Mongolia’s earliest Internet service provider, MagicNet. From 1995, it was encouraging policy makers to address strategies for national ICT policy development. In 1998, reflecting an early awareness of the digital divide issue, IDRC supported the trialing of wireless networking solutions for rural connectivity in the country. Its long time focus on distance education in Mongolia started in 1997, with financial assistance to support explorations in the use of satellite broadcasting for secondary schools, introduction of Internet and blended technologies to deliver distance education and the continued education of medical workers in remote aimags through distance learning. It supported evaluation and localization into Mongolian Cyrillic, of open source software for distance learning and other applications, as well as encouraged the comparison of distance education policies between Mongolia and its neighbours. In 2007, in commemoration of Ms. Narantsetseg Baljin, a key digital pioneer in the country, IDRC launched a series of competitive awards for higher education students with innovative ICT ideas. By the start of this decade, it began to contribute to the quest for development solutions in Mongolia through the grand design of the DREAM I.T. project, the raison d’être of this book, through a series of competitive research grants to government, non-government and academic institutions and private organizations on applied ICT4D research to influence policy, by demonstrating ICT projects that could positively impact on the socio-economic development of Mongolia. More recently, IDRC has continued its mandate to provide development research seed funding by building capacity within the country to tackle open development issues, such as open educational resources, Creative Commons and open networks.

Contributed by Maria Ng Lee Hoon

Other donor agencies have also assisted Mongolia to implement ICT4D initiatives in recent years.

It was one the eight countries, where ADB and the International Telecommunication Union (ITU) implemented a regional project on rural ICTs with the objective of improving rural ICT policy and regulatory/legal environments in the Asian region. The project scope included the study of rural ICT development policies, practices and experiences in selected Asian countries to develop a collective body of knowledge to share across the region (ICTPA, 2011).

Mongolia was also one of the three countries to implement an ADB pilot project on improving public service through ICTs. The project developed and pilot tested the Capability Maturity Model (CMM), an ICT project guidebook and online platforms in the education, health and public transportation sectors. A number of capacity-building workshops were organized, both in Mongolia and overseas, enabling decision makers to share their experiences of using CMM for assessing e-government projects implemented in their sectors and comparing sector progress with other countries (ICTPA, 2011).
The education reform project implemented at the Ministry of Education, Culture and Science (MECS) has a major component related to ICTs, in the form of an ICT master plan, addressing issues such as ICT policy, infrastructure, hardware, software, human resource development and capacity-building and content development in the education sector. The Open Education Management Information System (OpenEMIS) has been pilot tested in Mongolia. The Open EMIS was developed at the UNESCO Paris office to address the need of member countries to have a unified management information system and is designed to collect and report data on education systems. Its software, based on open source codes piloted only in the Mongolia OpenEMIS (ICTPA, 2011), is now available globally on the http://www.openemis.org/ website.

In 2012, through the Japan International Cooperation Agency’s grassroots project funding scheme, the Yamaguchi-Takada lab of Tokyo Institute of Technology and Mongolian State University of Education launched a five-year project titled, “Sustainable use of ICT for improving the quality of primary education in rural Mongolia.” The project aims at enhancing primary school teachers’ skills and competencies in classroom teaching by effectively applying locally-produced ICT-based teacher development material. By the end of the project, rural teachers should be able to produce their own training materials for student-centred learning, based on their local needs. Their material would be disseminated digitally, including via VCD/DVDs.

References


This chapter reports on a research project that conducted an assessment of the extent to which the website of the Mongolian Parliament was used, who used it, what information and other resources the users sought, whether they were successful in finding what they were looking for and if there was demand for a more interactive website. Based on the results of the assessment, the website was enhanced to enable better communication of website information between parliamentarians and citizens, particularly, in remote communities of Mongolia. In this chapter, we discuss and present the background, methodology and outcomes of the research, as well as policy recommendations arising from it. The purpose of the research was to contribute to knowledge and practice in the use of information and communication technologies (ICTs) for democratic governance, public administration and legislative processes.
Introduction

The rapid growth of ICTs is changing the environment within which many parliaments operate and influences how they are perceived by the citizenry. Rather than being mere witnesses to its transformative effects, parliaments are exploring ways to use technology to strengthen democracy and encourage political participation (Global Centre for ICT in Parliament, 2010). The process of e-governance implementation has generally occurred in three phases:

1. Publishing: using ICTs to expand access to government information;
2. Interacting: broadening civic participation in government; and
3. Transacting: making government services available online.
At the time of the study, Mongolia was mainly in the publishing and interacting phases of e-government implementation (infoDev & Center for Democracy & Technology, 2002).

In Mongolia, the Internet is generally considered an effective medium for communicating information about government decisions to the public and for encouraging e-participation by citizens in the parliamentary legislative system. The Internet is especially pertinent, since the country has a vast territory and one of the lowest population densities. Without the Internet, citizens who live in rural parts of the country, particularly in remote communities, do not obtain government information in a reliable and/or timely manner, and their comments and suggestions are not effectively considered by lawmakers.

When the Mongolian Parliament launched its website in 1998 (www.parliament.mn), it contained a range of information on parliamentary activities, such as full notes of the parliamentary sessions, laws, bills, archives, galleries, Members of Parliament (MPs), schedules of parliamentary sessions and discussions. Citizens, businesses, government and non-government organizations (NGOs), donor and international organizations have made use of this information. Parliament promotion centres were established in 20 aimags and seven districts of Ulaanbaatar to serve as citizen access points for information and other resources of the Parliament. While the Parliament website disseminated information to users, it had not made use of new website technologies to improve communication flows, when the research project presented in this chapter started in 2009. The project was jointly conducted for one and a half years (until 2010), by the research team and the secretariat of the Parliament of Mongolia.

Research objectives

The general objective of the project was to improve citizens’ participation in the parliamentary legislative process through online engagement. Its specific objectives were to:

1. Understand what factors motivated or inhibited use of the Parliament website by users and non-users;
2. Study the accessibility of the Parliament website to citizens of Mongolia, regardless of gender, age, education, geography and/or socio-economic status, in particular, those living in remote parts of the country;
3. Explore whether information and resources on the Parliament website met the demands and needs of citizens and identify information gaps and better ways of delivering information to citizens;
4. Develop, pilot and evaluate a revamped website and complementary services;
5. Design and test training programs for website users, enabling them to provide feedback; and
6. Identify what effects, if any, the revamped website had, on parliamentary legislative practices.

Research methods

Both quantitative and qualitative research methods, such as questionnaires and focus group discussions were used for the needs assessment and evaluation of the revamped website.

Needs assessment - survey

To conduct needs assessment, different segments of the population were surveyed to identify:
Who used the Parliament website;
Where they accessed it;
What information they sought;
Whether they found the required information and resources; and
What other information and resources they would like to have access to.

Furthermore, the study tracked non-users to explore:

Why they did not access the website directly;
If they accessed the website via an intermediary; and
Any barriers facing communities and individuals in more remote areas.

The study also assessed whether there was demand for an interactive website, enabling two-way communication through discussion forums, online forms for feedback, comments, suggestions and other features related to parliamentary hearings and inquiries, draft bills to be discussed, as well as some matters related to MPs.

This survey was conducted among 1,023 respondents in the capital city, Ulaanbaatar, and 16 sums of five aimags: Sukhbaatar, Khuvsgul, Zavkhan, Khovd and Govi-Altai (Figure 1) during March-June 2009, by the researchers, supported by assistants in the secretariat of the Parliament.

Of the respondents in Ulaanbaatar, 96% had access to the Internet, but only 71% of those interviewed in the rural areas. In terms of occupation, the proportions were: 50% worked in the public sector, 20% in civil society, 15% in the private sector, 10% were students and 5% pensioners. The gender representation was 42.6% women and 57.4% men. This discrepancy was mainly due to a higher percentage of male public servants. 65.2% of the respondents were over the age of 40.

Figure 1. Map of Mongolia showing the remote research sites in the aimags of Sukhbaatar, Khuvsgul, Zavkhan, Khovd and Govi-Altai
The questions in the needs assessment survey were:

- What are your possibilities to access the Internet?
- Do you use the Parliament website?
- Is the information on the Parliament website meeting your requirements?
- What methods, if any, do you use to express your views about the parliamentary legislative process?
- What are the opportunities to enhance public participation in the parliamentary legislative process?

**Needs assessment - focus group discussions**

Two project team members conducted focus group discussions in rural and urban areas. Altogether, 400 informants with almost equal representation of men and women, in Ulaanbaatar and the aimags of Sukhbaatar, Khuvsgul, Zavkhan, Khovd and Govi-Altai participated in focus group discussions. Among the participants in the rural areas were public servants, local residents and representatives of NGOs. Participants in the focus groups in Ulaanbaatar included NGOs, information technology experts and scholars. The discussions centred on usage of the website and e-participation in the parliamentary legislative process. Participants in the focus groups provided feedback on the website and suggestions for improvements. Examples of citizen e-participation in legislative processes in the State of Hawaii, USA, were shared.

**Research findings**

Key findings from the needs assessment survey were:

- Of the 821 respondents with frequent Internet access, 568 (69.2%) used the Parliament website regularly and 253 (30.8%) used it occasionally;
- Of those using the website, 132 (16.1%) checked the ongoing draft bills, 528 (64.3%) never checked these and 161 (19.6%) answered that the draft bills of interest to them were not available on the Parliament website;
- The main reason given by those not using the Parliament website was that the information and resources on the website did not meet their needs;
- Only 17.7% of the respondents who sent emails or mail to the MPs received responses; and
- Only nine respondents used the law discussion section on the website frequently, 193 used the section occasionally and 821 answered that they never used the section.

The open question exploring what kind of information users wanted to get from the website, received a variety of responses, including: information about the MPs, the progress on the implementation of the political agenda of the ruling party and legislation policies and procedures of the Parliament. The respondents also wanted to review discussion notes of draft bills and the minutes of the standing committee meetings.

The findings of the focus group discussions were reflected in changes made to the procedures of managing the website, all of which were implemented without any increase in expenditure. The secretariat of the Parliament approved the information technology-related procedures on November 19, 2009. The following changes were implemented:
1. New operating procedures for the Parliament website and intranet prescribed actions such as how to enhance website functions and upload information to the website and the intranet. Frames and codes were formulated for adding information on the website from departments of the secretariat of the Parliament;
2. Software procedures were formulated to ensure the smooth functioning of the computer software;
3. Procedures for using the transcripts of the Parliament plenary sessions and the sessions of the standing committees were formulated; and
4. Software security procedures were formulated.

**Revamping the website**

In addition to the process changes mentioned in the previous section, the research findings from both the surveys and focus groups informed the following changes to the website:

- A new bill discussion section was created on the main page of the website to receive public opinions regarding a particular bill and to provide information;
- A section for general suggestions and comments was also placed on the main page of the website, so those accessing the website could easily find it (Figure 2);
- A statistical register to show how many users were accessing the website was added;
- A facility enabling those accessing the website to contact MPs directly and to have an online discussion about particular bills was added; and
- The reports of the Anti-Corruption Agency, National Human Rights Commission, National Audit Office, General Elections Committee and Financial Regulatory Commission were uploaded on the Parliament website.

Figure 2. Revamped website showing public discussion
The secretariat of the Parliament started logging comments from the public and supervising the response process on a monthly basis, reporting on how many comments were received and how many of them were responded to. Users were most interested in following draft bills relating to the Election Law, Public Health Insurance Law and the Parliamentary Act on the Tavan Tolgoi Coal Mine.

Conclusions and recommendations

The objectives for parliament websites are becoming more complex and challenging as the Internet evolves. Parliaments began with the goal of providing basic information about the history, functions and members of the legislature. Later, they were tasked to provide copies of official texts of proposed legislation, then the verbatim accounts of debates, summaries of plenary actions, and copies of committee documents. With the emergence of the interactive web, tools have been added that encourage two-way communication between MPs and citizens, inviting the latter to share their views and possibly engaging them in the policy process (Global Centre for ICT in Parliament, 2008).

The main outcome of the project was the revamping of the Parliament website, enabling the public to participate online in the parliamentary legislative processes. However, the intention that MPs should respond to the comments and suggestions from the public, was generally not realized. Policy recommendations were developed by the research team and delivered to relevant policy- and decision-makers. The main point of the recommendations was to introduce new procedures and enhance those already in place at the time of the research, on two-way communications through online methods. Taking into account how the increased use of ICTs can enable direct public participation in the parliamentary legislative processes, the following recommendations, informed by the research results, were made:

1. Amend the rules regulating the methods for responding to citizen input, formalizing this process. The extent to which MPs reviewed and responded to citizens’ opinions and comments on draft bills was not clear. While the officers of the secretariat of Parliament logged the comments and suggestions of the public, they only distributed these to the relevant standing committees or the MPs. Where responses were given, it was usually after long delays, therefore, the response time needs to be improved.

2. The secretariat of Parliament needs to assign one of its officers to be responsible for placing draft bills on the bill discussion section of the Parliament website.

3. Enhance the website, based on the research findings, to give more emphasis on bill-related information to citizens. The website had many reports of the departments of the secretariat of the Parliament, that were not very useful for citizens. This issue was addressed in the scope of work for the project implementation. In addition to restructuring the website to make such information easier to find, the organizational back-office matters had not been attended to and need to be solved.

4. The secretariat of Parliament should integrate its Press and Promotion Department website (www.open-parliament.mn) into the Parliament website to avoid confusing the public. It should also continuously promote the Parliament website to the public.
References


This chapter presents the findings of research aimed at identifying the needs of the public for information services and exploring the extent to which these were met by government administrative agencies. The 2009 study covered five aimags and six districts of Mongolia’s capital city, Ulaanbaatar. A total of 1,200 citizens and 450 civil servants in government administrative agencies were involved in the survey. The purpose of this study was to develop recommendations for the government agencies to improve their information services for the public.
Introduction

The Academy of Management and the Cabinet Secretariat of Mongolia jointly implemented a study in 2009 to examine government information service provision to the public of Mongolia, with a view to assessing its responsiveness and efficiency. Questionnaires were distributed and collected from over 1,200 residents (840 from Bulgan, Govi-Altai, Dornod, Umnugovi and Uvs aimags and 360 from Ulaanbaatar) as well as 450 civil servants working in ministries and agencies in urban areas. Interviews were conducted with key decision makers at the Ministry of Health, the Ministry of Social Welfare and Labour and related agencies. Observations of how civil servants provided information services to the public were carried out. As a result of this survey, recommendations for improving the quality of public information service provision were presented to officials from the Cabinet Secretariat, ministries, agencies and representatives of local governors’ offices during a workshop in December 2009.

Research questions

The objectives of the study were to explore information needs of the public and to assess the level of satisfaction with the government’s information services, as well as to develop recommendations for the improvement of public information service provision. The researchers attempted to answer the following questions:

1. What kind of information did the public want from government organizations? What motivated them to look for information; for what purposes did they use information?
2. Did the information services available at the time of the study meet their needs; and if so, what was the level of citizens’ satisfaction? In addition, the following issues were studied through desk research at the government agencies of the opinions and requests which had been sent to the government organizations, including dates, frequencies and how those requests were answered or resolved.
3. What kind of obstacles did the citizens face when they wanted information services from the government agencies?
4. How was satisfaction measured when someone had been provided with an information service? The following areas were examined: sources of information used; the quality and scope of those resources; and level of satisfaction after being provided with the information service requested.
5. In order to determine appropriate ways to improve information services provided by central and local government organizations, the researchers also studied how government organizations had tried to improve information services. They did that by administering questionnaires, carrying out observations and by interviewing the civil servants responsible for, or whose job functions were related to information service provision, so as to determine how they were serving citizens with information.
6. To what extent did the government websites provide quality information services? The following were studied: the content of the information available on the websites of the government agencies, public use, updates and how the online information met the public’s information needs.

The process of the research, the coverage, innovation, and importance of the research were explained to the respondents. The study also focused on the extent to which new information and communications technologies (ICTs) were used in solving the above-mentioned issues.
Research findings

The majority of survey respondents emphasized the importance of improving the transparency of information and the accountability and communications skills of public servants. There was little difference in the assessments of the service delivery from the ministries, agencies and local administrative organizations, in response to the question related to the quality of information services provided by government administrative agencies. Respondents were asked to rate the quality, using the response terms of “sufficient”, “reasonable” and “fair”. As shown in Figure 1, the number of responses with “sufficient” was the lowest, and the number of responses with “reasonable” was the highest.

![Figure 1. Responses to a question about the quality of information services](image)

In response to a question about their frequency of using computers, 30% of informants answered that they did not use computers on a daily basis. This indicates that providing online information services was not a sufficient means of ensuring that information services were delivered to the public. It was observed that usage of computers highly depended on age and the place of residence of the respondents.

Figure 2 shows that the level of computer usage declined with the increase in age. Computer usage also declined at the lower educational levels, and depended on the place of residence as well.

![Figure 2. Usage of computers by age group](image)
Table 1 shows the types of information sources which respondents used to obtain information from government agencies. The percentages refer to the the total sample of 1,200 respondents.

<table>
<thead>
<tr>
<th>Source</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television</td>
<td>1033</td>
<td>86.1</td>
</tr>
<tr>
<td>Newspapers</td>
<td>642</td>
<td>53.5</td>
</tr>
<tr>
<td>Magazines</td>
<td>83</td>
<td>6.9</td>
</tr>
<tr>
<td>Radio/FM radio stations</td>
<td>276</td>
<td>23.0</td>
</tr>
<tr>
<td>Internet</td>
<td>360</td>
<td>30.0</td>
</tr>
<tr>
<td>Responsible officer of government agency</td>
<td>192</td>
<td>16.0</td>
</tr>
<tr>
<td>Training</td>
<td>296</td>
<td>24.7</td>
</tr>
<tr>
<td>Books, booklets</td>
<td>125</td>
<td>10.4</td>
</tr>
<tr>
<td>Information desks</td>
<td>74</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Table 1. Types of sources used to obtain information provided by government and public agencies

According to the survey findings, the Internet has become the third largest source for information among respondents. When respondents were asked about the challenges they faced in the process of obtaining information from government agencies, they answered that they did not see the lack of capacity to use Internet and computers as the main problem. Rather, they stated other challenges, such as lack of needed information, uncertainty about where to obtain required information and inconvenience of having to go to the government offices repeatedly for particular information.

In suggesting how to resolve the problems and challenges they faced, survey respondents revealed that computers were not seen as a priority tool for overcoming problems faced in the process of obtaining information from government agencies. Respondents who did not use or did not have skills to use the government websites were older and those who did not use computers on daily basis were mostly from the aimags, rather than from Ulaanbaatar.

Of those who responded that they were able to use the government websites, 68.6% answered that they used computers sometimes, 15.5% that they never used computers and 12% that they used computers regularly. On the question related to whether the government websites satisfied the information needs of the respondents, 3.9% responded “fully”, 58.1% responded “to some extent” and 27.4% “not at all”.

<table>
<thead>
<tr>
<th>Source</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasonable</td>
<td>172</td>
<td>14.3</td>
</tr>
<tr>
<td>Not understandable</td>
<td>142</td>
<td>11.8</td>
</tr>
<tr>
<td>Not completely operational</td>
<td>206</td>
<td>17.2</td>
</tr>
<tr>
<td>Information updating is not regular</td>
<td>237</td>
<td>19.8</td>
</tr>
<tr>
<td>Required information is not available</td>
<td>120</td>
<td>10.0</td>
</tr>
<tr>
<td>Don’t know</td>
<td>120</td>
<td>10.0</td>
</tr>
<tr>
<td>Do not use government websites</td>
<td>203</td>
<td>16.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1200</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 2. Evaluation by respondents of government websites
Table 2 shows that only 14.3% of respondents (17.2% of those who used the government websites) thought the quality of those sites was reasonable. This may suggest that the government should pay more attention to the issues of organization, server down times, information updates and enrichment of government websites.

<table>
<thead>
<tr>
<th>Form</th>
<th>City</th>
<th>Aimag</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-form (in file)</td>
<td>12.4</td>
<td>4.7</td>
</tr>
<tr>
<td>Document (printed)</td>
<td>23.6</td>
<td>20.0</td>
</tr>
<tr>
<td>Internet</td>
<td>10.4</td>
<td>4.7</td>
</tr>
<tr>
<td>Meeting in person</td>
<td>42.0</td>
<td>51.3</td>
</tr>
<tr>
<td>On the telephone</td>
<td>10.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Other</td>
<td>1.6</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 3. Preferred forms of receiving information

Table 3 shows that the most preferred form of receiving information was via face-to-face (42% of city respondents and 51.3% of aimag respondents), followed by the printed document form. However, information through the telephone emerged as the third preferred choice for aimag respondents, while city respondents stated e-form and the Internet as their third preferred option.

A concurrent survey of civil servants about their views on whether they were able to place information required by citizens on their websites, found that 62.5% of respondents thought they were in a position to do so, 73.5% responded that that they updated their websites on a regular basis or sometimes. However, these responses by the civil servants conflicted with the opinions expressed in the user survey, in which respondents indicated that the government websites were not regularly updated, not fully operational and did not contain required information. It is thus the researchers’ conclusion that the information content placed on the government websites and particularly, on websites of the local administrative organizations, was neither sufficiently enriched, nor updated regularly. The ability to perform these tasks was directly linked to the information technology knowledge and skills of the civil servants as well as to the availability of information technology tools at the government agencies.

**Conclusion**

It emerged that the policy of government organizations to provide information services widely through the Internet and to encourage interactivity through emailing, as set forth in the guidelines for the development of ICT in Mongolia, was not adequate to meet the growing needs and demand for information services. Although civil servants in Mongolia believed that they had offered appropriate information to the public, the respondents did not feel adequately serviced. It can be concluded that much additional effort was required to make the information resources more accessible to the public. The researchers recommended the implementation of measures to improve the provision of government information services to the public in order to achieve tangible results. The following recommendations were made:

- To organize special consulting services for citizens;
- To set information standards to be used for information service provision;
• To regularly identify information requirements, where and when this information can be obtained;

• To make this information publicly accessible through a variety of channels;

• To create an integrated pool of information, based on the information needs and demands of the public, at the premises of primary units of government administrative agencies and place this information on websites to the extent possible;

• To update information on a regular basis; and

• To compile, print and disseminate essential information in booklets as well.

Acknowledgements

Our thanks to the officials of the Ministry of Health, the Ministry of Social Welfare and Labour, agencies of these ministries and officials of governors’ offices in Bulgan, Khovd, Govi-Altai, Dornod and Umnugovi aimags who extended assistance to us for the conduct of the survey.
PART II
Education
This chapter describes an approach undertaken by Education Wave (davalgaa.mn), a Mongolian non-governmental organization (NGO), to investigate how parents and teachers of preschool children can become engaged in using and adapting open educational resources (OER). The project involved designing, localizing and implementing OER for the purpose of improving parents’ and teachers’ knowledge and abilities to work with early-age children. The aim of this iterative multi-phased research project was to study the practice impacts on parents, preschool and primary school teachers when they used, adapted and localized early childhood OER learning materials for the Mongolian context. The outcome of the first phase was capacity-building in an appropriate design approach for developing and localizing OER materials for free use by schools, teachers and parents.
Introduction

Children constitute a considerable proportion of the Mongolian population. As of 2009, 11.3% of the entire population was in the age range of 0–5 (NSO, 2009a). The number of births increased from 55,774 in 2007 to 68,762 in 2009 (NSO, 2009b).
Mongolia has a well-developed system of education from preschool to tertiary levels, including institutions for technical and vocational education and training. As of 2012, there were 750 general education schools, educating approximately half a million students and there were about 175,000 higher education students in Mongolia. The Ministry of Education, Culture and Science (MECS) oversees the development and progress of education and training.

The Mongolian education system has several components:

- preschool, including kindergarten,
- five years of primary education, beginning at age six,
- four years of lower secondary education,
- three years of upper secondary education,
- post-secondary and higher education, and
- technical education and vocational training.

The Mongolian education system developed from a system of education based on the Soviet model to a more flexible system, including improvement of the efficiency and effectiveness of education at all levels through rationalization and decentralization. Since the 1990s, there has been a relaxation of state control over curriculum in Mongolia, with efforts at diversification based on local community needs and a shift from teacher-centred to a more student-centred curriculum (Weidman, 2002; Steiner-Khamsi, 2007).

The Mongolian secondary school system underwent major reforms, replacing the 10-year program with an 11-year program in the 2004-2005 academic years and, more recently, introducing a 12-year academic program during 2008-2009 (MECS, 2008). The most influential and potentially problematic changes of the educational system have occurred among students in grades 1 and 2, with six-year-olds now enrolling in school as grade 1 students instead of eight-year olds as in previous years, resulting in younger children being enrolled in grades 1 and 2. In other words, four years of primary school have been increased to six years, forming part of the 12-year education system. Children up to the age of eight have been included in the “early-age children” category. Parents of preschool children and grades 1 and 2 students were targeted as participants in the research project reported in this chapter.

Supporting open development practices in Mongolia

During a period of four years, between 2008-2012, a project named Development Research to Empower All Mongolians Through Information Communications Technology (DREAM I.T.) conducted capacity-building initiatives to introduce and demonstrate a range of open practices in Mongolia, including open government, open data and open access publishing. Recently, DREAM I.T. has focused some of its research activities specifically at demonstrating open practices in the education sector.

The creation and use of OER in Mongolia is at an early stage. Public awareness of OER and
their potential use in education is low and at the time of conducting the research reported in this chapter, Mongolia had not formally established a Creative Commons (CC) affiliate or localized CC licences. In addition, there is no legal environment for OER and the relationship between OER and publishing interests has not been fully explored. However, Internet use is rising in Mongolia. By 2010, 30.6% of the population, corresponding to 709,625 residents from the age of six were using the Internet. Of this Internet user population, 49.3% lived in Ulaanbaatar (NSO, 2010). Thus, the increasing Internet use in Mongolia presented an opportunity for the creation and spread of OER using CC licences. The project described in this chapter aimed at promoting optimized and effective learning for early age children, through the use of OER, and in the longer term, influencing educational policy in Mongolia.

The research project

Education Wave, a Mongolian NGO, was provided research funding through the DREAM I.T. project to research the design and implementation of an OER materials development and training strategy for teachers and parents of early-age children. A key emphasis was on the capacity-building of the project participants.

In 2011, Education Wave presented a multi-phased research plan at the DREAM I.T. national seminar. It proposed to conduct applied research to determine whether adapted OER materials could be used and whether these OER would be useful for engaging children and be interesting for them. The researchers sought to answer the following questions:

1. Under what conditions did teachers use, adopt and/or adapt OER in their practices? and

2. Would communities of parents and teachers come together and regularly add, revise and improve the resources?
At the national seminar, Education Wave also launched a child development book, titled *The Deciding Age*. To demonstrate the practice of making resources open and freely available, the book chapters were made publicly available through Education Wave’s website, davalgaa.mn, using the Creative Commons Attribution-NonCommercial-ShareAlike licence (CC BY-NC-SA). This licence allows free reproduction and distribution of material for all uses except commercial gain. The research team used the OER materials from the book with the study participants. The Education Wave website and resources (Figures 1 and 2) can be viewed at www.davalgaa.mn.

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**Figure 1. The davalgaa.mn website**

**Figure 2. User-generated videos on the CC-licensed davalgaa.mn website**

The aim of the Education Wave research project was to study the practice impacts on Mongolian parents and preschool, kindergarten and primary school teachers when they created and used Mongolian early childhood education learning OER materials, or used materials adapted from OER repositories worldwide, after they were localized for a Mongolian context. Another aim was to make all of the project’s Mongolian material, whether original or adapted
from OER in other languages, freely available for use by preschools and schools, teachers and parents across the country.

Sixty parents from the capital, Ulaanbaatar, and from communities in the Dundgovi, Orkhon, Khovd, and Dornod aimags participated in the project, along with preschool, and grades 1 and 2 teachers from schools in each of the participating aimags (Figure 3). Appendix 1 lists a summary of research participants.

Figure 3. Project participants came from four aimags across Mongolia

Conceptual framework for the research process

The project was proposed as a multi-phase design-based research (DBR) approach, adapting the ideas of Sandoval & Bell (2004), Reeves, Herrington & Oliver (2005), Reeves (2006) and Amiel & Reeves (2008). Phase 1 research took place in 2011-2012.

Figure 4. Empirical research vs. design-based research process (adapted from Amiel & Reeves, 2008)
DBR differs from predictive, empirical research, as described in Figure 4. It is a systematic and flexible research methodology, aimed to improve educational practices using iterative analysis, design, development and implementation processes. Based on collaboration among researchers and teachers in real-world settings, DBR is intended to lead to contextually sensitive design principles and theories (Wang & Hannafin, 2005).

DBR is appropriate for situations where research is conducted in authentic natural educational settings. It is based on the desire for research to have practical impact by having clear relevance for the improvement of education. As such, DBR provided a process that seemed well suited for researching an educational technology innovation in an international development context with participants in Mongolia.

Baseline study

Within the framework of this research, both quantitative and qualitative approaches were used, including survey questionnaires, interviews and document analysis.

Within the design-based framework of the research, the project team sought to explore the following research themes over multiple phases:

- Determine what barriers and challenges parents and teachers faced and what skills and knowledge they wanted to obtain in order to work and interact with their children;
- Identify skills and knowledge that parents had used to work with their children;
- Study how teachers developed curricula and how these could be improved or be created as OER; and
- Draw conclusions from the results of the research and identify key issues to guide the design processes for project implementation, including materials development, training and evaluation.

The first phase was the conduct of baseline questionnaire research with parents and teachers for the purpose of identifying what problems they faced when working with early age children; what methods they used when they communicated and worked with children; as well as what additional teaching resource materials they needed. The results of the baseline research were intended to identify needs and a design pattern for the types of open resources that would be created or adapted and made freely available for use by teachers and parents across Mongolia.

Based on the research objectives, questionnaires were developed in order to determine the challenges and needs facing parents and teachers. The survey was conducted during June and July 2011, by the project team and by the officers in charge of primary and preschool education at the Education and Cultural Authority of the four aimags where the study was conducted. Sample questionnaires can be found in:

- Appendix 2 - Questionnaire for parents with preschool age children (0 - 6 years) and
- Appendix 3 - Questionnaire for parents whose children completed grades 1 and 2.

Sixty parents with children up to the age of six, including 52 mothers and eight fathers, aged 21-46 from Ulaanbaatar and the four aimags were involved in the questionnaire process. In terms of parental education, 27.7% of fathers and 8.5% of mothers had
secondary education, whereas 72.3% of fathers and 91.5% of mothers had higher education diplomas or degrees. When categorizing parents by their children’s ages, there were 18 parents who had children in the age range of 0-18 months, 20 parents with children aged 19-36 months, 14 parents with children aged 37-60 months and seven parents with children aged 61-72 months.

In the research with the school-age children, there were no participants from the Dundgovi aimag. A total of 32 parents (nine fathers and 23 mothers) whose children completed grades 1 and 2 were in the 28-48 age range. In terms of parental education, 21.1% of fathers and 6.9% of mothers had post-primary education, 36.8% of fathers and 17.2% of mothers had secondary education and 42.1% of fathers and 75.9% of mothers had graduated from tertiary education. A majority of the fathers had secondary education, while a majority of mothers had a professional diploma and bachelor degree. In general, the fathers’ education level was lower than the mothers’. All parents from Ulaanbaatar had at least secondary education.

In parallel with administering the questionnaires, interviews were also conducted to follow up on questionnaires and to identify and explore specific problems facing teachers and parents.

The research team used a document analysis approach when conducting research on how teachers developed curricula and explored how these could be used to support an OER approach. Sample curricula studied were those formulated and used in the academic year 2010-2011 by those involved in the project. Curriculum analysis consisted of two parts: detailed analysis of the curricula and a general evaluation on the curriculum development process.

Findings of the baseline study and how they guided the project

The baseline study identified that teachers used several approaches and methods to teach children as many subjects as possible, and a teacher-centric manner was the dominant educational practice. Other key findings were:

- Both parents and teachers perceived they had insufficient knowledge and skills for working effectively with children, but they had strong desire to know about children’s development characteristics and to have a positive influence on their development.

- Parents and teachers stated that they were ready to use OER materials and information posted on the website if the research team would translate and localize advice and information on early age children’s development, effective learning approaches and various types of teaching aids from other open websites.

- Parents and teachers mentioned that they were interested in video more than text materials. In addition, they wanted to share their ideas and pressing problems with each other by using the Internet and the online forums provided on the davalgaa.mn website.

- Research showed that 75% of parents could not provide their children with good support when doing their homework. They also mentioned that there was pressure from the school to do more homework and this pressure caused anxiety for both children and parents.

With respect to the problems with homework, the project team believed that this issue should undergo more in-depth research to determine the support and training that should be provided to teachers to appropriately match the specific needs of early age children. In
addition, based on the results of the first round of research it was determined that there was a need to explore the preference for formal lessons by preschool teachers.

It was agreed to pursue further research into these two areas for the purpose of identifying or generating ideas on how to address these issues and the participants formulated the following questions:

1. Why did preschool teachers prefer formal lessons to other activities when organizing daily activities and developing curricula? and

2. Why were homework and working with children at home on school-related tasks considered difficult by parents with grades 1 and 2 pupils?

It is intended that these questions be followed up in future research, as the project time did not allow for them to be addressed.

OER implementation

Following the baseline study, the team conducted face-to-face surveys, using questionnaires and an exploratory online study (online discussion) among parents about the impact of working with children, using the initial set of OER posted on the davalgaa.mn website.

Many parents said they were beginning to understand their children better through working with them more closely using the new resources provided by the project team. The videos of single concept lessons were an innovative approach that the project team tested with parents and teachers. This approach received positive responses.
The final report, *Using OER to Improve Parents’ Knowledge and Abilities to Work with Early Aged Children* (Education Wave, 2012) provides additional details on the project, its goals, methodology, data collection and results.

**Content:** davalgaa.mn website’s pages were viewed over 80,000 times over a five-month period, which makes it a highly viewed website in the education sector.

![Google Analytics report](image)

**Figure 5. Google Analytics report for davalgaa.mn over a five-month period (Orgodol, 2012)**

After the davalgaa.mn website had been operational for some time, we arranged a Google Analytics report of the site, for a five-month period in 2012, illustrated in Figure 5. The report showed that the website was visited over 80,000 times.

An evaluation on the accessibility and usability of the davalgaa.mn website was conducted by a consulting Internet company in Mongolia (Orgodol, 2012). According to the evaluators, the content and use of the website were good, but they indicated there was some room for improvement on the design side. Specific recommendations from the report included:

1. Redesign the front page. The use of extraneous information on the front page should be limited to make the footer more visible. Extraneous information may also restrict a first time visitor’s interest in drilling down into other pages.

2. Navigation structure review. The main menu was specifically designed for preschool teachers, and this distracted parents’ attention and could restrict their further drill-down to the website’s quality contents. The evaluators suggested the following categories on the main menu: Teachers | Parents | Children | News | Forum | Comments | Video | Gallery. Further detailed menu redesigning processes should include representatives from teachers, parents and children.

3. Improving the forum section and making it more user-friendly in terms of a login page and forum design. Users were not registering for the forum and discussing their issues. Instead, they used the comments section, which did not require logging in.
4. Adding user menus. This should include the most useful functions for logged-in users, such as my drafts | my articles | inbox | my friends | my forum discussions. Also, this menu should include content publishing hand-outs for people who do not have basic IT literacy skills.

5. Categorization for contents should be done. While planning the category structure, the organization should consider website audience and usability issues mentioned above.

Concluding remarks

What has been accomplished?

The project team built its capacity in using a design-based research approach. Parents and teachers became acquainted with free and open educational resources that can be used to engage and support their work with early age children.

The capacity of participants in the project to use Internet-based learning resources improved. The project team members, along with school and preschool teachers learned how to develop and use OER with early age children. Both print and video resources were developed by the participants and made available via the davalgaea.mn website.

The project team developed and published The Deciding Age book and made it available for free download.

What’s next?

In the future, the team intends to research and identify changes in the methods employed by teachers in their curriculum development and work with children, resulting from the design ideas generated in this project. The researchers also plan to examine changes in day-to-day practical work that might occur after teachers have started using the OER materials provided by the project team, teachers and other contributors.

The project team intends to build a national open website where teachers and parents of early age children can improve their knowledge and abilities. Specifically, they aim to:

- increase the number of users, including parents and teachers who use OER as a result of public awareness on davalgaea.mn website;
- increase the number of people who use and develop OER, by conducting further training; and
- improve the quality, quantity and diversity of OER developed in Mongolia and made available on the national OER website.

It is expected that in the future, the number of teachers who use and create OER will increase, thereby improving their knowledge and abilities to work with early age children. The team believes that by scaling the project, more teachers will become responsive to children’s needs and interests. This would also enhance policy makers’ and teachers’ recognition of the use of OER as a new important tool to help upgrade teachers’ professionalism by building a supportive community of practitioners.
References


Appendix 1

Summary description of parents and teachers involved in the project

<table>
<thead>
<tr>
<th>No.</th>
<th>Aimag (province) and city</th>
<th>Teachers involved in the project</th>
<th>Parents involved in the project</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Children’s age</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Dornod aimag</td>
<td>Teachers from kindergarten # 8</td>
<td>1 parent with child aged 0-18 months</td>
<td>8 parents</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 parent with child aged 19-36 months</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Teachers with grades 1 and 2 students from school # 1</td>
<td>1 parent with child aged 37-60 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 parent with child aged 61-72 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 parents with grade 1 students</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 parents with grade 2 students</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Khovd aimag</td>
<td>Teachers from kindergarten # 1</td>
<td>1 parent with child aged 0-18 months</td>
<td>8 parents</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 parent with child aged 19-36 months</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Teachers with grades 1 and 2 students from “Tsast Altai” complex school</td>
<td>1 parent with child aged 37-60 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 parent with child aged 61-72 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 parents with grade 1 students</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 parents with grade 2 students</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Orkhon aimag</td>
<td>Teachers from kindergarten # 4</td>
<td>1 parent with child aged 0-18 months</td>
<td>8 parents</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 parent with child aged 19-36 months</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Teachers with grades 1 and 2 students from “Bayan-Undur” complex school</td>
<td>1 parent with child aged 37-60 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 parent with child aged 61-72 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 parents with grade 1 students</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 parents with grade 2 students</td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>Location</td>
<td>Teachers</td>
<td>Parents</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------</td>
<td>-----------------------------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Dundgovi aimag</td>
<td>Teachers from kindergarten # 3</td>
<td>1 parent with child aged 0-18 months&lt;br&gt;1 parent with child aged 19-36 months&lt;br&gt;1 parent with child aged 37-60 months&lt;br&gt;1 parent with child aged 61-72 months</td>
<td>4 parents</td>
</tr>
<tr>
<td>8</td>
<td>Ulaanbaatar</td>
<td>Teachers from kindergarten #42</td>
<td>2 parents with child aged 0-18 months&lt;br&gt;2 parents with children aged 19-36 months</td>
<td>12 parents</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Teachers with grades 1 and 2 students from school # 24</td>
<td>2 parents with children aged 37-60 months&lt;br&gt;2 parents with children aged 61-72 months&lt;br&gt;2 parents with grade 1 students&lt;br&gt;2 parents with grade 2 students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>All teachers from 5 kindergartens and 4 schools</td>
<td>6 parents with child aged 0-18 months&lt;br&gt;6 parents with children aged 19-36 months&lt;br&gt;6 parents with children aged 37-60 months&lt;br&gt;6 parents with children aged 61-72 months&lt;br&gt;8 parents with grade 1 students&lt;br&gt;8 parents with grade 2 students</td>
<td>40 parents</td>
</tr>
</tbody>
</table>
Appendix 2

Sample questionnaire for parents with preschool age children (0 - 6 years)

The purpose of the questionnaire is to determine difficulties of parents with preschool-age children in working with their children and supporting them. We hope you will help and support us by answering the survey questions. NB: If you choose the answer “Other” could you please describe your options.

General questions:

Aimag/District: .................................. Name: .......................... Age: .................

Contact details: Tel: ........................ If you have email address: ..........................

Who are you for your child/children? (please circle)
a. Father  
b. Mother

Educational level of parents (please mark on appropriate one with you)

<table>
<thead>
<tr>
<th>Educational level</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneducated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-primary education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postgraduate education</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Employment status of parents (please mark on appropriate one with you)

<table>
<thead>
<tr>
<th>Employment status</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed of public sector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed of private sector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NGOs (Non-governmental organization)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>International organizations (Project, Program etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time employee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Profession: ..........................................
(If you do not have profession, you can write down “NO”)
Main questions:

1. How old is your child?
   a. 0-18 months   b. 19-36 months   c. 37-60 months   d. 61-72 months

2. Number of people in a family ........ Number of children in a family ........

3. What ages do you think are very important periods of childhood development to pay attention to? (Please circle one of the answers you have chosen.)
   a. 0-5 years   b. 6-11 years   c. 12-14 years   d. 15-18 years

4. Where do you obtain any information for parents? (please mark each box)

<table>
<thead>
<tr>
<th>№</th>
<th>Source</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TV, Radio</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Other parents, friends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Books, handbooks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Regular newspaper and magazine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Official events (parent meeting etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Other . . . . . .</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Do you have an Internet access? (You can circle more than one answer.)
   a. Internet access at home   b. Internet access at work
   c. Internet access at Internet cafe   d. No Internet access

6. How long do you use the Internet per day, on the average?
   a. Up to 30 minutes   b. From 30 minutes to 1 hour   c. More than 1 hour

7. What difficulties do you find to obtain information for preschool parents on the Internet? (if you use internet, could you please order them from the most difficult to the least difficult one)
   a. Spend a lot of time to find information
   b. Few materials in Mongolian language
   c. Language barrier to use materials in foreign languages
   d. The materials for parents are rare
   e. Other . . . . . . . . . . . . . . . . . . . .

8. Have you faced any difficulties when you work with your child/children?
   a. Often   b. Sometimes   c. No
9. If you had difficulties, could you please write down mostly-faced three difficulties?
A
B
C

10. How often do your child/children get sick?
   a. Often  b. Sometimes  c. Seldom

11. Could you please write down two most frequent illnesses of your child?
   a ------------------------------------    b -------------------------------------

12. Do you have difficulties with your child’s behavior?
   a. Often  b. Sometimes  c. No

13. If you have difficulties could you name two of those?
   a ------------------------------------    b -------------------------------------

14. Do you agree with the statement that one of the ways to overcome the difficulties as working with your child is Internet access?
   a. Yes     b. No

15. What kind of information from Internet, books or other sources will be useful to you?  
   (Could you please order them from the most useful to the least useful one?)
   a. Information on how to take care of and upbringing of child __
   b. Information on characteristics of ages and thinking of children __
   c. Ways to interact with children and recommendation __
   d. Other parents’ experience and advice __
   e. Advice on how to help children to learn __
   f. Advice on how to influence child’s behavior and communication __
   g. Games to play with children and ways how to play __
   h. Advice on how to help children to right habits into daily life __
   j. Other .............................................

16. How would you like to exchange your opinions, feedback, comments or ask questions about materials on the internet or website?
   a. Write an email       b. Post a comment
   c. Use of Yahoo Messenger   d. Other.................

If you have any other comments or requests could you please share it with us?
(You can use the back side of this page)

Thank you
Appendix 3

Sample questionnaire for parents whose children completed grades 1 and 2

The purpose of the questionnaire is to determine difficulties of parents with grades 1 and 2 students of the primary school in working with their children and supporting them. We hope you will help and support us by answering the survey questions. NB: If you choose the answer “Other” could you please describe your options.

General questions:

Aimag/District: ......................... Name: ...................... Age: .................

Contact details: Tel: ...................... If you have email address: ......................

Who are you for your child/children? (please circle)

a. Father  b. Mother

Educational level of parents (please mark on appropriate one with you)

<table>
<thead>
<tr>
<th>The level of education</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneducated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Primary education</td>
<td></td>
<td></td>
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<tr>
<td>Secondary education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postgraduate education</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Employment status of parents (please mark on appropriate one with you)

<table>
<thead>
<tr>
<th>Employment status</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed in the public sector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed in the private sector</td>
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</tr>
<tr>
<td>Self-employed</td>
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</tr>
<tr>
<td>NGO (Non-governmental organization)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>International organizations (Project, Program etc.)</td>
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<tr>
<td>Retired</td>
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<td>Student</td>
<td></td>
<td></td>
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<tr>
<td>Part-time employee</td>
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<tr>
<td>Herder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Profession: ........................................ (If you do not have profession, you can write “NO”)
Main questions

1. What grade did your child complete? ...........

2. Number of people in a family .......... Number of children in a family ...........

3. What ages do you think are very important periods of childhood development to pay attention to? (Please circle one of the answers you have chosen.)
   a. 0-5 years   b. 6-11 years   c. 12-14 years   d. 15-18 years

4. Did you face any difficulties when your child firstly enrolled in the school?
   A. Often    B. Sometimes    B. No

5. If you had any difficulties, could you please name two most difficult ones?
   A
   B

6. What subject does your child like most? (Please circle one of the letters)
   a. Mongolian language       b. Mathematics
   c. People and the Environment d. Art and Craft, Technology
   e. Music                    f. Physical Education

7. Are you able to help your children when they do their homework and review what they have studied?
   a. Yes, I am     b. Sometimes     c. No, I am not

8. If the answer is “No I am not” why?
   ...........................................................................................................................

9. Could you please mark or circle three difficulties that you have faced when you help your children for their homework and reviewing their studies?
   a. No time to work with my children
   b. My children do not like their lessons
   c. My children are tired when they study
   d. Homework is not clear and instructions are not understandable
   e. We cannot purchase the textbooks

   If you have chosen the answer “My children do not like their lessons”, could you please describe the reason why?
   ...........................................................................................................................
   ...........................................................................................................................
   ...........................................................................................................................
10. **Do you use the following sources when you work with your children? How?**
   (Please mark each box.)

<table>
<thead>
<tr>
<th>The sources</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Textbooks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Workbooks/books</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Other books, handbooks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Radio, TV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Regular newspaper and magazine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Internet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Official events (parents meeting etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. **Do you have Internet access?** (You can circle more than one answer.)
   a. Internet access from home
   b. Internet access from work
   c. Internet access from Internet cafe
   d. No Internet access

12. **If you have Internet access how long do you use the Internet, on the average?**
   a. Up to 30 minutes
   b. From 30 minutes to 1 hour
   c. More than 1 hour

13. **What difficulties do you find to obtain information for preschool parents on the Internet?** (if you use the internet, could you please order them from the most difficult to the least difficult one)
   a. Spend a lot of time to find information
   b. Few materials in Mongolian language
   d. Language barrier to use materials in foreign languages
   c. The materials for parents are rare
   e. Other

14. **Does your child have any health problems that you have to take care of?**
   a. Yes
   b. No

15. **If you have, what problem do you have?**

........................................................................................................................................

16. **Do you have any problem that you are worried about communication between you and your children?**
   a. Often
   b. Sometimes
   c. No
Exploring the Use of Open Educational Resources with Teachers and Parents of Early-Age Children in Mongolia

17. If you have a problem in what cases do you have the problem that you are worried about your communication with the children?

........................................................................................................................................................................
........................................................................................................................................................................

18. Do you agree with the statement that one of the ways to overcome the difficulties is Internet access?

a. Yes, I do  

b. No, I do not

19. What kind of information from Internet, books or other sources will be useful to you? (Could you please order them from the most useful to the least useful one?)

a. Information on characteristics of ages, children’s development and growth ...

b. Ways to communicate with children and recommendation ...

c. Advice on how to help children to learn successfully ...

d. Interesting tasks to do with my children ...

e. Children’s story ...

f. Games, crosswords, picture books, etc. ...

g. Science-fiction, videos ...

h. Other: .................................................................................................................................

20. How do we exchange our opinions, feedback, comments or questions about materials on the Internet or website?

a. Write an email

b. Post a comment

c. Use of Yahoo Messenger

d. Other: .............

If you have any other comments and requests could you please share it with us? (You can use the back page.)

........................................................................................................................................................................

Thank you
2010-2013 Awareness raising on OER and open issues
2011-2013 National seminars and capacity-building workshops
2011-2012 Project on *Exploring the Use of Open Educational Resources with Preschool Teachers and Parents*
2012- Conceptualization of *ONE Mongolia* vision and advocacy
2013 Signing of Mongolia Creative Commons Affiliate; launch of *ONE Mongolia, ONE Academy and ONE Student websites*
Starting from 2010, the *DREAM I.T.* project brought in consulting expertise from Canada to Mongolia to introduce models of practice associated with open educational resources (OER). The consulting visits were also designed to stimulate local interest in OER research projects in Mongolia, with a focus on exploring and investigating potentially transformative education strategies for the country.

A *National Seminar on Open Educational Resources*, organized by the *DREAM I.T.* project coordinators, was held in Ulaanbaatar in October 2010. This seminar introduced Mongolian educators and government officials to OER projects worldwide and provided opportunities for in-depth discussion about the merits and mechanics of open education principles and practices. Additional information about the 2010 OER seminar activities in Mongolia can be found at http://bit.ly/DREAMIT_OER_OCT2010.

A follow-up workshop was held in September 2011 (http://bit.ly/DREAMIT_OER_SEPT2011) where there was general discussion on open publishing, open data and open government, in addition to OER. The *DREAM I.T.* projects presented preliminary research results and demonstrated materials that would be made accessible as OER, using Creative Common (CC) licences.

In July 2012, a national seminar was held to further brief Mongolian educators on OER developments that were taking place worldwide and to discuss the OER Declaration that emerged from the UNESCO World Congress on Open Educational Resources in Paris in June 2012 (http://unesco.org/oercongress/). The UNESCO Congress brought together Ministers of Education, senior policy makers, expert practitioners, researchers and other relevant stakeholders from around the globe to pass the 2012 Paris OER Declaration. The Declaration marked a historic moment in the growing movement for OER and called on governments worldwide to license publicly funded educational materials as open resources for public use.

Spurred on by the 2012 UNESCO OER Declaration, Dr. Enkhbat Dangaasuren laid out his vision for an Open Network for Education - *ONE Mongolia*, at the July 2012 national seminar. This included the structural components that would be needed for Mongolia to join the ranks of other nations supporting OER developments. His proposal received enthusiastic support from many of the educators who attended the national seminar. During the period August 2012 to May 2013, *DREAM I.T.* partners rallied further support within the primary, secondary and tertiary education sectors in Mongolia for the *ONE Mongolia* initiative.

Dr. Enkhbat Dangaasuren signs the Creative Commons Mongolia Affiliate Memorandum of Understanding. Photo by David Porter
In May 2013, a national seminar on OER was organized in conjunction with the Institute of Teachers’ Professional Development of the Ministry of Education, Culture and Science, and held in The House of Teacher Development. At this national seminar on May 30, 2013, the **ONE Mongolia** project team announced the signing of the Creative Commons Mongolia Affiliate Memorandum of Understanding (MOU) and the team officially launched the **ONE Mongolia**, **ONE Academy** and **ONE Student** websites.

Figure 1. The Creative Commons Mongolia Affiliate website provides information on open licences and a licence creation tool aligned with the Mongolian legal system.
At ONE Academy, a component of ONE Mongolia, over 150 Mongolian video lessons have been made openly available to students, teachers, parents and the public, covering subjects from higher, secondary and primary education to preschool and lifelong learning through its website using a Creative Commons (CC) attribution share-alike licence (CC-BY-SA). The video lessons can be viewed at http://www.one.mn

Figure 2. The ONE Academy website with streaming video resources that are licensed using a Creative Commons Attribution Share-Alike licence (CC-BY-SA).
**ONE Student**, another component of **ONE Mongolia**, provides classroom tools powered by Google Education, including Google Drive, Forum, Sites and Gmail to university and school campuses in Mongolia, without the costs and complexities that come with maintaining hardware and software. This free (and advertisement-free) set of customizable tools enables lecturers, teachers and students to work together from anywhere and learn, effectively supported by open and reusable learning resources.

Figure 3. The **ONE Student** website offers free access to Google Apps for all students and teachers in Mongolia, along with access to CC-licensed educational resources.
Championship and commitment by Dr. Enkhbat and fellow Mongolians, combined with consulting expertise from BCcampus (http://www.bccampus.ca/) and financial support from the International Development Research Centre (IDRC) contributed significantly to all these historic milestones.

OER seeds have been widely scattered in Mongolia over the past four years. They are now beginning to blossom.
CHAPTER 6

Can Technology Level the Education Playing Field in Mongolia? An Innovative Education Program Using Blended Instructional Technologies

Okhidoi Otgonjargal

Meeting the needs of students across the vast territory of Mongolia, especially those located in remote areas who are often unable to access high quality educational resources, has long been a challenge. The wide difference in education quality offered in urban and rural areas exacerbates the urban and rural divide. Sporadically, various types of distance and open learning activities have taken place in order to reach the most marginalized in the country, although little is known about the outcomes of these. The Education Channel of Television Mongolia attempted to bridge the learning gap through research and piloting of a distance education program, using mixed delivery technologies.

This chapter analyzes the research processes and findings of the year-long pilot project for secondary school students that was implemented in 2009 by the Education Channel of Television Mongolia, named the Blended Technology Education Program (BTEP). BTEP developed high quality education content and combined television, the Internet and mobile phones to deliver it nationwide. The research revealed positive learning outcomes.
Introduction

Developed and developing countries are increasingly using new information and communication technologies (ICTs) for distance and open education. One of the objectives of ICT-supported distance education in developing countries is to enhance the socio-economic conditions of people living in remote areas, by improving their access to quality education (Berman, 2008). Distance education delivery in these countries is mostly by both print materials and electronic media, such as radio, television, the Internet and mobile phones.

While the level of education and target groups for distance education vary, professional development and higher education still dominate distance learning delivery. Teacher training, a key component in improving education quality, particularly in rural areas, is often facilitated by distance learning, which improves the access, equity and quality of teacher professional development (Jamtsho & Bullen, 2007; Robinson, 2008). Distance education is also common in the field of second and foreign language learning (Egbert, 2000). Researchers recommend that traditional media, including radio and television be continued for distance education in developing countries, in order to make higher education more accessible (Berman, 2008).

The quality of open and distance learning has often been in question, so the methodologies used in delivering distance education have been of interest to researchers. Jonassen et al. (1995) emphasize the importance of the design of distance and open learning programs,
questioning whether these can support constructive learning. A constructive distance learning system needs to create “learner-centred, collaborative environments that support reflective and experiential processes” (Jonassen, et. al., 1995, p.1). The authors lay down four system attributes to achieve such environments in distance and open learning - context, construction of knowledge, collaboration and conversation among the learners. In order to support and meet the needs of distance and open learning designers in making the programs learner-centred and collaborative, Bonk & Dennen (2007) developed an online learning framework, consisting of five principles: psychological justification, participant interaction, level of web integration, student and instructor roles and pedagogical strategies.

However, despite numerous studies in technology-based distance education, there are still some major areas that need more research. Bullen (1999) considers as valuable, the recommendations of Phipps and Merisotis for future research, including more research on “individual differences such as gender, age, educational experiences, motivation and learning style” and “the interaction of multiple technologies rather than the impact of a single technologies”.

Blended learning, defined as a combination of online and face-to-face instruction (Kim, Bonk & Teng, 2009), is a common terminology to describe interaction in the open and distance learning context. Blended learning is most commonly used in higher education, especially at graduate degree levels to combine distance and traditional face-to-face learning (Mathur & Oliver, 2007). The blended learning approach is adopted mainly for the following three reasons: improved pedagogy, increased access and flexibility and increased cost effectiveness (Graham, 2006). These factors are basically in line with the reasons for adoption of distance education worldwide. Moreover, research studies conclude that blended learning enables students who come from more traditional teaching and learning backgrounds to develop their autonomy, self-efficacy and individual organizational skills, due to its self-regulated functions (Mathur & Oliver, 2007).

Furthermore, blended learning is increasingly adopted in workplace settings, including business, governmental and not-for-profit organizations for delivering in-service professional development training. Blended learning is expected to feature strongly in the future, both in Asian and European countries (Kim, Bonk & Teng, 2009).

In Mongolia, the development of distance and open learning should be seen in the context of the socio-economic transitional developments in the early 1990s. The drastic change in the social and economic environment at that time necessitated an education system reform. The transition from a socialist regime with a centrally governed economy to a free market economy had unforeseen impacts on social service delivery, including education. The Mongolian education system started declining, placing access to and quality of education at risk. Equal access to quality education became unattainable in the formal education system. Thus, the value of an informal education system was recognized in Mongolia, and this was the beginning of distance and open learning in the country.

The distance education initiatives at that time focused on developing print materials and using media tools, either radio or television, often accompanied by learning materials on CD and VCD (Batchuluun, 2005). One of the first distance education initiatives was the non-formal education for nomadic women in the Govi (Gobi) desert areas, offering literacy programs, health education and training in income-generation skills. Considered one of the most successful non-formal distance education projects in Mongolia, benefitting 16,000...
women (Batchuluun, 2005), it was designed to utilize print materials, radio broadcasting and mobile teachers visiting the target groups. The success was attributed to the voluntary services provided by literate and skilled people in the local areas - a legacy from the socialist era. It was realized that, due to the deteriorating government services, self-reliance was an inevitable framework for managing the project (Robinson, 1999).

However, little evidence is found on the utilization of distance and open learning in formal education settings, except the DANIDA-funded in-service education for teachers (Robinson, 1995) and a few initiatives that had taken place in higher education to incorporate Internet-based distance learning for enriching some of the ICT courses (Damdinsuren & Sukhbat, 2005). Thus, technology-based distance and open learning, especially those involving blended learning is still new in the context of the Mongolian formal education system. There were several more of such donor-funded distance education projects that aimed at specific social groups through non-formal education, including the Learning for Life program (Batchuluun, 2005). Uyanga & Ariunaa (2005) suggest that if technology-based learning is to have a future in education in Mongolia, the first steps should be to focus on initializing it through informatics and computer subjects in secondary school education, and to pay more attention to providing practical and theoretical abilities among school children to utilize ICTs and then to integrate the wider use of ICTs in other subjects.

Several observations can be made from the brief review of literature in distance and open learning. Firstly, blended learning is dominating in the area of higher education and workplace settings worldwide, while being experimented and researched in school environments. Secondly, there is little or no evidence of whether and how various technological tools and media options are combined in order to test and analyze a distance education program in school settings. Thirdly, in the Mongolian context, both blended learning and blended technology learning, as a combination of various technology tools utilized in school settings, were new and wide open for experiments and research studies at the time of the BTEP project.

**The research aspects of the Blended Technology Education Program (BTEP)**

With a strong cultural emphasis on education and almost 35% of the population under the age of 18 (MEA, 2005), there was high demand for education and the necessity to provide equal opportunity for good quality education in Mongolia at the time of the study.

About 66% of school children lived and studied outside of Ulaanbaatar (Ministry of Education Culture and Science, 2007). They were educationally disadvantaged due to inexperienced teachers and lack of up-to-date materials. The vast territory and its scarce population present challenges for the delivery of good quality education services to everyone throughout the country.

The best and brightest teachers often serve in a few schools in the cities and are hesitant to teach in the most remote areas. Due to insufficient and non-systematic in-service teacher training opportunities, teachers often lack either content knowledge or teaching skills. On the other hand, there is a pool of both knowledgeable and highly skilled teachers for all subjects. Their talents and passion could be imparted beyond the schools where the teachers work, to students nationwide, using the most recent technologies. The technology-based distance education model can be used to connect the brains and hearts of the best teachers to many more children and adult learners in Mongolia.
A large percentage of the population lives in traditional “gers” (nomads’ circular tents), without running water but with satellite dishes and home phones quickly being eclipsed by the ubiquitous mobile phone. New technologies are spreading out to all sectors in Mongolia, making noticeable changes in the lifestyle of the rural population.

Television, mobile phones and the Internet have become more integral to everyday life across the country, but have been underutilized in the field of education. In 1999, approximately 50-60% of households owned televisions and this number grew each year, as families had more disposable income and the reach of cable television increased. By 2007, there were 34 Internet service providers, and all aimags were then connected, with the Internet reaching out to the sum level. The number of Internet users increased from 10,000-15,000 in 2001 to almost 50,000 users in 2009. By June 2009, approximately 1.9 million people, representing more than 70% of the total population, owned mobile phones in Mongolia (Information, Communication and Technology Agency, 2009). There were then four mobile phone providers in the country. There was at least one operator in each aimag and each sum.

Within the above-mentioned context, BTEP tested a distance education method that combined the three different media: television, Internet and mobile phone, for the purpose of delivering good quality education content and conducting a study on its impact on children. Two subjects were chosen, English language of grade 8 (13 year-olds) and computer education for students in grade 10 (15 year-olds). One rural and one urban school were chosen to participate in the project. The lessons for the two subjects were presented via television nationwide, and to facilitate an interactive learning process, web versions of the lessons were uploaded on an online platform. Mobile phones were used for the interaction between learners and instructors. A comprehensive research study was conducted to assess the outcome of the BTEP program on the school children.

Research objectives and questions

The research objectives were to assess the effectiveness and efficiency of the blended technology program from three perspectives, related to potential changes in:

1. Student achievements in academic learning;
2. General aptitude and interest in learning by the students; and
3. Understanding of and attitude towards the traditional classroom face-to-face teaching and blended technology-based distance education.

A baseline research study, two progress monitoring research studies and a final research study were conducted during the one-year intervention. The findings of each of these stages were analyzed and compared with control groups for each group.

The study was set up to explore:

1. Educational achievements of control group students versus the pilot group students. This was measured by administering tests to all students at the beginning and end of the year, as well as twice during the year. The test scores were used to compare the progress between the two groups.
2. Educational achievements of the students at the two different schools. Test score data were examined to determine whether there were any differences between the rural and urban schools.
3. Educational achievements of boys versus girls in all groups. Test score data were used to determine whether there were any gender-based differences in the learning outcomes. This information was used to investigate whether the materials taught favoured one gender over the other. This data were also important to assess at what levels, students of both genders were at the beginning of the intervention and how they progressed.

4. Effectiveness of teaching the two subjects. The benefits and effectiveness of English language and computer education classes were evaluated by analyzing test scores and opinions from students via questionnaires, as well as individual interviews and opinions from teachers. If we found that a subject was not effectively taught, we investigated why. This was useful in understanding which subjects were more or less suitable for learning through blended technologies.

5. Student learning satisfaction. This was assessed through questionnaires, interviews, observations and conversations and the research data were used to help understand if the BTEP program offered something new and interesting to students that in turn encouraged them to learn more, both in and out of class.

**Research methodologies**

The research methodologies applied in each of the research studies mentioned above, included both quantitative and qualitative approaches:

1. Tests on the two subjects;
2. Questionnaires with 52 questions (closed-ended with multiple choice and Likert scale type methods and two open-ended questions); and
3. A randomly selected sample for focus group discussions and individual interviews with each student for the purpose of triangulation.

All the pilot and control students participated in all aspects of the study. A school in the same district in the city and another school in a rural area with similar socio-economic conditions were chosen for the control groups.

The data were processed and analyzed using the Statistical Package for the Social Sciences (SPSS). Guidelines were developed for the interviewers of the individual interviews and the facilitators of the focus group discussions. Ten open-ended questions were included in the guidelines. However, discussions were open for issues and opinions that were not included in the guidelines and the interviewers and facilitators were able to ask probing questions that were not listed.

Important timelines for the research studies are shown in Table 1.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of BTEP</td>
<td>January 15, 2009</td>
</tr>
<tr>
<td>Baseline Research Study</td>
<td>February 2009</td>
</tr>
<tr>
<td>Progress Monitoring Research Study #1</td>
<td>May 20–25, 2009</td>
</tr>
<tr>
<td>Progress Monitoring Research Study #2</td>
<td>December 21-22, 2009</td>
</tr>
<tr>
<td>Final Research Study</td>
<td>January 11-16, 2010</td>
</tr>
</tbody>
</table>

Table 1. Activities and timelines
A particular circumstance should be noted here. BTEP started on January 15, 2009 and ended on January 15, 2010. However, in Mongolia, the school year begins in September and ends in June. Therefore, the project straddled two contiguous school years. Thus, the grade 8 pilot students in English language advanced to grade 9 in the second half of the project term and the grade 10 pilot students in computer education advanced to grade 11. Schools in Mongolia break during the summer, from mid-June to the end of August. Although the project was designed for one school year without interruption, the time it took for the project proposal to be processed and approved, resulted in it starting in January, rather than September. Thus, the first progress monitoring research study took place in May, 2009 before the summer break. However, the second progress monitoring took place in December, instead of November as planned, due to the three-week school quarantine caused by the H1N1 influenza outbreak. The impact of the break was reflected in the findings, which showed a noticeable decline in the results of the second progress monitoring compared to the first one.

Throughout the rest of the paper, the students will be referred as the English language group and the computer education group, without referring to their grades.

Research findings

Key findings of the baseline research study

Students’ socio-economic background

Most of the participating students came from families with average living standards, which means they could afford to meet the needs of food, housing, clothing and other basic necessities. However, one in every five urban students came from families that could only afford to meet the needs of food, housing and clothing. One in four urban students lived in apartment buildings, 56.9% live in ger districts, either in a ger or a wooden house. Some 15.7% of the students lived in dormitories. However, 36.6% of the rural students lived in gers, 43.9% lived in wooden houses and 19.5% live in school dormitories.
Students’ performance levels

A test on each of the two subjects was given to the students to determine the level of their subject knowledge and skills at the beginning of the project. In addition, the students were asked to evaluate their own performance in general. The scale used in these assessments was:

- A: 90-100%
- B: 80-89%
- C: 70-79%
- D: 60-69%
- F: 0-59%

Approximately 10% assessed themselves as A students, while the vast majority chose B or C. None of the students indicated F. However, the results of the tests showed a different and rather shocking outcome, with 95.4% receiving F, whereas 4.6% received A or D. The computer test was given to 46 students. Over 80% received F, 6.5% received A or B and the rest received C or D marks. The test results of both subjects came out to be much lower than expected. The project team speculated that these low results could at least partially be due to the tests being developed by the project team, rather than by the teachers in the pilot schools. The teachers had provided the project team with the curriculum and the latter based the tests on this. Another reason could be that there were no pre-tests.

In order to measure the outcome, the project teaching team tried to ensure the same level of difficulty and the breadth and depth of the test materials, throughout the progress monitoring and final research studies for the two groups.

Access to and use of television, the Internet and mobile phones

Each of the project schools had a computer laboratory with 20-25 desktop computers and Internet access. The project students were scheduled to work in the computer lab at least three times a week. Approximately half of the students (47.7%) had a computer at home as well. When asked about the main purpose of using home computers, of those who responded to the question, 29.3% answered that they used them to improve their knowledge of how to use computers. Another 25.6% said they needed computers to do homework, 17.7% used them for typing and 14% played games on computers.

Most of the students in Ulaanbaatar accessed the Internet in Internet cafes, an alternative to the Internet access at the school lab, whereas, most of the rural students had Internet access at school only. Almost everyone had a television set at home or in the dormitory room where they lived.

Table 2 shows access to mobile phones by the project students.

<table>
<thead>
<tr>
<th>Access to a mobile phones</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>74.3</td>
<td>25.7</td>
</tr>
<tr>
<td>Rural</td>
<td>84.2</td>
<td>15.8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>84.3</td>
<td>15.7</td>
</tr>
<tr>
<td>Female</td>
<td>75.6</td>
<td>24.4</td>
</tr>
</tbody>
</table>

Table 2. Access to mobile phones by location and gender
On average, 80% of the total students had a mobile phone (84.3% of male and 75.6% of female students). Slightly less than half used their mobile phones mainly to talk, 34% to send and receive text messages, 65% for voice messages and only 2.6% used the multimedia functions of their phones.

**Student understanding and attitudes towards distance learning**

Almost half (48.9%) of the students who participated in the survey understood distance education as a way of obtaining knowledge and skills through the Internet and television, regardless of the location of the learners. Also, 33.8% of the students viewed distance education as a way of acquiring knowledge in a cost-saving way, using technology instead of having to go to school. Some 5.9% of the respondents did not know how to describe a distance education mode of delivery. The students emphasized the potential of obtaining knowledge in spite of vast distances and acquiring information additional to that provided by the teachers, as the major strengths of distance education. The major weaknesses of distance education mentioned by the students were the lack of feedback on the learning process from teachers, the lack of access to the Internet at home, inadequate skills to use the technology and the difficulty of watching the television due to contention in the home environment over control of the television channels.

**English language and computer education in schools**

English language was taught for two hours a week to the urban students and four hours a week to the rural students. When asked about the most dominant teaching method used by their English teachers, the students responded as follows: 1% agreed that the teacher and the students talked and listened equally in class, 25% responded that the teachers talked more and the students listened, while only one student said that students talked more.

The computer education group of the project had been studying computer education since grade 9, except a few who had more opportunities to learn through paid courses, but the extent of these studies varied considerably, with 70.5% having studied it for 1-3 years, 27.3% for 4-6 years and 2.3% for 7-9 years. At the time of the project start-up, both the urban and rural students were taught computer education for one hour a week.

One interesting fact was that 26.8% of the rural students wanted to pursue teaching as a career which was 14.1 times higher than the urban students. Also, 17% of rural students wanted to be doctors. This may reflect the need for teachers and doctors in rural areas and/or the lack of awareness of other professions. The other occupations the students named, included cooking, building & construction and herding.

**Challenges and difficulties in English language and computer education in schools**

Almost 80% of all the students who participated in the survey agreed that the computer is one of the most useful tools for everyone in the 21st century. However, the answers to “what is the role of computers in your future life?” varied. The urban students gave higher scores than the rural students, to various aspects they believed were significant in using computers. This might be due to the relatively limited use of computers in rural, compared with urban areas.

The survey revealed that feeling shy was a common problem that students had in learning English, and 49% said that they were ashamed of their poor speaking, listening, grammar and writing skills, which constrained them in expressing themselves in the classroom. Also, 20.2% mentioned that it was difficult to learn English because they found the teasing of other students in the class, distracting.
Student expectations for the distance education pilot project

The students expected most of all, to improve their knowledge and grades for the two subjects. Some 46% of the English group expected to improve their level of English as a result of the intervention, while 23% wanted to improve their speaking skills in particular. In addition, the students wanted to improve their pronunciation and listening skills. The computer education group also expected improvements in the subject, with 77% hoping to have greater knowledge and better computer skills by the end of the project.

Analysis of progress monitoring and final research findings

In this section, findings from the two progress monitoring and final research studies are presented and compared with the findings from the baseline study. The findings are presented to answer the key research questions.

Achievements and views of students in the pilot groups

Achievements in academic learning

![Figure 1. Achievements in the English language pilot group](image)

A comparison between the final results and the baseline for English language skills (Figure 1) showed that A students improved 3.5 times. Before BTEP, there was not a single B student, however, throughout the pilot, 20% were B students. The proportion of F students was reduced from 95.4% before the pilot, to 26.5% after the pilot. Figure 1 shows a steady increase in A, B, C and D students, and a sharp decrease in F students. In addition, findings from questionnaires and individual interviews confirmed that the level of English had improved among the pilot group students during BTEP.

![Figure 2. Achievements in the computer education pilot group](image)

Although there was an unusual increase in A students from the baseline to the first progress
monitoring in the computer education pilot group (Figure 2), the number of A students reduced in the second monitoring. The decline in the second progress monitoring could be partially explained by the H1N1 influenza outbreak mentioned in the previous section. However, the proportion of A students at the end of the pilot increased to 14.3% from only 2.2% in the baseline, whereas, F students decreased to 18.4% from 49% in the second progress monitoring and from 80.4% of baseline.

Changes in general aptitude and interest in learning of the students

Figure 3 shows changes in various factors related to aptitude and interest in learning.

Figure 3. Changes among pilot students in various factors related to aptitude and interest in learning

Approximately one tenth of the students confirmed that BTEP helped students to perform better, one of three students indicated that their knowledge level in the respective subject areas increased. A significant number of students expressed that they became more interested in learning and self-study. A conclusion may be drawn from here that BTEP had a positive influence on students’ interest in learning and general aptitude.

Figure 4. Changes among pilot students in their skill levels
Figure 4 indicates that certain skills were enhanced among students, especially independent learning skills, and abilities to concentrate, challenge and demand more from themselves towards learning.

Changes in understanding of and attitude towards the traditional classroom face-to-face teaching and blended technology-based distance education learning

A question relating to advantages and disadvantages of traditional face-to-face teaching and distance learning was included in the questionnaire administered to students. In the second progress monitoring, 54.9% of all pilot students considered face-to-face teaching more effective, because it provided opportunities to interact with teachers directly. However, 20.8% indicated that distance learning was more effective, as television lessons could be repeated; students felt less suspicious about discrimination; and television lessons were interesting, enabling students to learn much within a relatively short time. Furthermore, about 24% thought that the combination of face-to-face and distance learning would make learning very effective. During the individual interviews, students stated the disadvantages of distance learning, as lack of direct teacher participation and inadequate of access to and use of equipment. However, more than half of all interviewed students said that if the capacity and accessibility of computers and the Internet improved, they would be in favour of distance learning.

Comparisons of educational achievements between pilot and control groups

More than 26% of pilot students got A in English at the end of the pilot, but only 1.8% of the control group students achieved this grade. Almost half of the pilot students were graded either C or D (47%), while 14.3% of control group students were either C or D students. The vast
majority, 83.9%, in the control group were F students, whereas the figure for the pilot group was 26.5%. It may be concluded that BTEP helped to improve student performance and was an effective method for learning English.

Figure 7 shows the comparison between control and pilot groups in urban and rural settings.

![Figure 7. English language test result comparisons between pilot/control and urban/rural students](image)

38.5% of the pilot English group in the urban setting scored A and B, but only 3.7% of the control group achieved A and nobody scored B. The ratio for C and D was 38.4% : 22.2%. The ratio for F for these two groups was 23.1% : 74.1%.

In the rural setting, nobody scored A in the pilot or the control settings. However, 13.1% in the pilot group achieved B, while the control group did not score any B. The proportions for C and D were 56% (pilot) and 7% (control). Finally, the ratio for F stood at 30.4% (pilot) and 93% (control).

One conclusion may be drawn here. The higher score in the pilot English language group compared with the control group could be a sign of the effectiveness of BTEP.

Figure 8 shows the pilot and control group comparison for computer education.

![Figure 8. Results of final tests for computer education (pilot/control)](image)
The computer education pilot students who scored A and B accounted for 36.7%, while the figure for the control group students was only 4.9%. The proportion getting C and D in the pilot group was 44.9%, compared with 18.8% in the control group. As the proportion of F students in the pilot group was 18.4%, compared with 76.3% in the control group, it can be assumed that BTEP influenced the pilot students positively.

When the scores of the pilot and control groups for computer education in the urban and rural settings were compared, it was clear that the pilot students scored much higher. For instance, 26.7% of pilot students scored A or B, whereas A and B students in the control group accounted for only for 7.0%. There were 2.5 times fewer students scoring F the in pilot group than in the control group. The differences between the pilot and control groups in the rural setting were much starker. Over half of the rural pilot students scored A or B, whereas none in the control group scored A and only 2.7% were able to score B. The vast majority of the rural control group of computer education got F. However, the pilot group’s F students accounted only for 5.4%. The most influential factor behind such low performance of the rural control group was attributed by the research team to the lack of access to computers and the Internet.

The comparisons above indicate that BTEP made a significant contribution to enhancing subject knowledge among the pilot group students both in rural and urban settings and that it can be used as an effective method of delivering good quality computer education to school children.

Educational achievements of pilot students at the two different schools

English language comparisons

Figure 10 shows the English language results at different stages of the research throughout the BTEP project and provides a comparison between the rural and urban pilot schools.
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Figure 10. Changes in pilot group English language achievements – comparison between urban and rural

Improvements were noticeable from the baseline to the final research studies in both rural and urban pilot schools. However, rural students did not score any A during the second progress monitoring and final research studies, whereas the urban students consistently increased the number of A students from 4.3% in the baseline to 17.4%, 11.1% and 15.4% in the first and second progress monitoring and final research studies, respectively. The slight decrease from the first to the second monitoring that was evident throughout the findings occurred here as well. Although there was a gradual increase in the number of C students in both settings, the number of students earning D made a big difference. It was 3.8% for urban students and as high as 34.8% among rural students. The number of F student in the urban school was also less than those in the rural school.

Figure 11. Changes in various English language skills between the baseline and final study results

Figure 11 shows the key language skills attained by the pilot students. These language skills were inadequate during the baseline in both schools, although the levels of these skills among the urban students were better than those of rural students. Listening was the skill that students performed better than any of the other skills, but students did very poorly in writing. However, as the results from the final research study revealed, the skills improved considerably at the end of the intervention. Almost all students were able to perform the listening and vocabulary tasks fully. However, writing remained the least mastered skill, accounting for only 16.6% and 30.0% by rural and urban students, respectively.
An interesting development was that the rural students caught up with the urban students in their English language performance. Although differences remained in the English skills between the rural and urban students, these differences had reduced compared with the baseline. Furthermore, in some aspects, particularly listening and vocabulary building, rural students scored higher than the urban students.

In general, rural students scored slightly less than urban students in English language, and there could be several reasons for this outcome. Both the test results and the findings from individual interviews and focus group discussions enabled the researchers to suggest that the rural teachers were not as proficient as the urban teachers in guiding their students throughout BTEP, e.g. making sure the students went online to watch the television lessons. Less initiative and ownership over the project by the English teachers as facilitators and coaches for the students during BTEP in the rural school might have been the crucial factor behind the marginal performance differences in English between the urban and rural students.

Computer education comparisons

![Figure 12. Changes in pilot group computer education achievements – comparison between urban and rural](image)

Only in the baseline did urban students perform better than the rural students in computer education. Throughout the implementation of BTEP, rural students’ scores outperformed those of the urban students, including during the progress monitoring and final studies. While there were fewer A students in the second, compared to the first progress monitoring among the rural students, the rural school did much better that the urban, where no student got A. A significant difference is also indicated in the final study where only 5.3% of the rural students got F, in comparison to 26.6% of their urban peers. The results of the tests seem to indicate that BTEP worked better in the rural setting. However, researchers found an unexpected factor behind this from the focus group discussions and individual interviews. The essence of the success was related to a computer teacher in the rural pilot school who took initiatives and coached his students by making sure that the television lessons were not missed, that students went online and he helped them during the online sessions. This rural teacher kept in regular contact with the BTEP team and its IT staff members, asking questions, seeking additional learning materials and some professional advice and guidance. On the other hand, such practices were not only absent in the urban school but also, the minimum expectations of the urban school for maintaining the computer lab and making it available for the students as agreed, was not always met.
Gender aspects of achievements in all groups

Figure 13. Gender differences in the final English language test

Figure 13 shows that in English language, girls performed better than boys. The number of girls who received A was three times higher than the boys. However, there was not much difference between the genders with respect to B, C, D and F. Overall, there was not a considerable difference in the effectiveness of BTEP among male and female students. This was also the case for computer education (Figure 14), for which there was no significant difference between boys and girls.

Figure 14. Gender differences in the final computer education test

Comparison of the effectiveness between the two subjects

Figure 15. Student satisfaction comparisons in final survey between English language and Computer education
As indicated in Figure 15, there was no evidence to suggest that BTEP worked better for one subject over the other. According to the surveys and interviews, the level of satisfaction was quite similar for both subjects. However, some students expressed their opinions that language classes were more suitable for teaching from a distance, using technology, especially television. The English lessons that BTEP produced provided good visual images, interesting layout, audio support, opportunities to repeat pronunciations and various types of grammar exercises. The majority of the students from both English groups were very fond of the television lessons.

For computer education, BTEP had to come up with an effective and efficient way to present the computer classes on television. Various methods were tried and finally, the computer lessons were presented via a virtual studio with an instructor. The best way would have been to combine the lessons on television with work on computers in the lab. This was practised in the urban school. However, the circumstances did not always allow this practice in the rural school.

**Student learning satisfaction**

Figure 16 shows that the levels of satisfaction of pilot students were consistent throughout the pilot year. Approximately 80% of the students were highly satisfied with the implementation of the project. Approximately 20% expressed medium satisfaction. The reasons they mentioned for the lower satisfaction included lack of direct interactions with the teachers during BTEP, lack of opportunities to ask questions and get replies immediately and the infrequent tests and exams. They wanted their progress to be assessed more often. With respect to technology, students complained about the inadequate speed of Internet at schools, hampering the capacity of the computers to download online materials.

**Conclusions**

The tests of English language and computer education for the baselines were developed in accordance with the national curricula taught at the time. BTEP developed its one-year curriculum for these subjects in line with the national curricula in order to meet the needs of formal schooling and implement government-approved curricula. The tests for the two subjects for the progress monitoring and final research studies for BTEP were based on the content delivered to students during the project.

The English language pilot group performance indicated a consistent improvement for
the entire duration, both in rural and urban settings, except in the second progress monitoring. When the final study was compared with the baseline, the number of A students increased 3.5 times. The number of B, C and D marks increased during the pilot as well. Finally, the number of F students dropped to 26.5% from 95.4% of the total pilot students. Therefore, it can be concluded that BTEP was effective in teaching English language to the pilot students.

Although the urban students of the English language group performed better than the rural students at the end of the project, the difference was not considerable and could be attributed to the initiatives and ownership of the teachers in the urban school who did better in coaching the students. The research team came to a conclusion that BTEP’s English language teaching was accepted by pilot students of both genders almost to the same extent. The final research findings did not indicate a substantial difference in acceptance, performance and feedback among male and female students of the pilots.

With some fluctuations during the pilot, especially between the first and second progress monitoring tests, the final research study of the computer education group showed consistent improvements in the number of students earning A, B, C and D, compared with the results from the baseline. The number of F students decreased about 3.5 times. Therefore, it can be concluded that BTEP’s computer education was effective for the pilot students, including girls, who achieved more As in the final test than boys. The findings indicated that rural students benefitted more from the project than the urban students. Over half of the rural students earned A or B, but the figure was only 26.7% for urban students. However, the research team argued that the difference could be attributed to the teacher. The ownership over the project and initiatives taken by a computer teacher in the rural school was seen as a key factor for the higher success rate. His coaching of the students, making sure they watched the television lessons and used the online hours efficiently and even accompanying them during the sessions contributed to the better outcome.

Certain skills developed more than others among the pilot students during BTEP. The results from the surveys, interviews and group discussions unanimously confirmed that the self-study/independent learning skills of the students were enhanced extensively, as were their concentration skills.

BTEP implementation was not without problems. Although the major advantage of BTEP was the use of technologies, key difficulties faced by students in participating and benefitting from the project were ironically associated with the technologies themselves. The low speed of access to the Internet, insufficient capacity of computers at the schools and sometimes low quality of television transmission were mentioned by students as the key difficulties faced during the project. Lessons were learned regarding the need to plan meticulously, especially in making sure that the relevant technology tools are not only available, but also up to standard to successfully implement the planned tasks.

Based on the one-year experience, and subject to improvements in technologies, BTEP could be expanded and scaled up in a number of ways. Firstly, the number of students involved could be increased by including either the whole school and/or an entire district for parallel learning to the existing face-to-face teaching. The wider coverage would test the capacity and strengths of BTEP. Successful implementation of BTEP and rigorous system testing may result in serious consideration of BTEP replacing some of the face-to-face teaching. This may be effective for the education process and an economically efficient approach for the government to provide good quality education services in the schools.
Furthermore, *BTEP* can also be used in developing and implementing good quality extra-curricular activities for gifted students and for slow learners who need extra help with catch-up programs. Not all schools are financially capable of implementing extra-curricular activities that meet their students’ needs. With good management and leadership by a school that takes ownership over the program, *BTEP* can open up opportunities to schools. Finally, *BTEP* can also be used in developing non-formal education programs.

In conclusion, *BTEP* has been proven, through this project, to be effective. Improvements of the system, further development of its segments and using the system wisely for better educational effectiveness and efficiency is now the responsibility of the educators, policymakers and school administrators.

**References**


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Can Technology Level the Education Playing Field in Mongolia? An Innovative Education Program Using Blended Instructional Technologies

*Distance Education, 9*(2), 7-26.


This chapter explores information and communication technology (ICT) education in secondary schools and tertiary institutions in Mongolia, reporting on a study that compared the curricula, contents and teaching methods of Informatics taught at the secondary school level with the Compulsory ICT Training taught at the tertiary level. A key finding was that, while there is a national standard for Informatics at the secondary level, the Informatics Curriculum Standard for Primary and Secondary Education, there is no similar standard at the tertiary level. Other important findings were that most schools did not fully comply with this standard and that the Compulsory ICT Training in the tertiary education system did not have any content linkages with the Informatics Curriculum in secondary education and simply repeated the content. The project team recommended that the teaching of Informatics at the secondary level comply fully with the standard; the university Compulsory ICT Training build its contents from the secondary school Informatics Curriculum and be based on international standards; and that universities incorporate ICTs in the teaching of other subjects, thereby linking ICT education with the other disciplines.
The need, importance and purpose of ICT education

An important aim of tertiary education in developing countries, such as Mongolia, is to prepare manpower capable of working at the level of international best practices. To achieve this, the knowledge and pedagogical skills of teaching staff are very important. In Mongolia, the National Association of Colleges and Employers conducts an annual survey to determine what qualities employers consider most important in employment applicants. The top ten attributes employers look for are: communication skills (verbal and written); honesty/integrity; teamwork skills; interpersonal skills; motivation/initiative; strong work ethics; analytical skills; flexibility/adaptability; computer skills and self-confidence.

Integration and support of new information and communication technologies (ICTs) is thus vital to teaching and learning goals. The successful integration of ICTs to support learning goals depends upon several factors (ACM, 2003, p.11):

- vision and leadership;
- access to resources (hardware and software);
- arrangement of those resources in accessible learning spaces;
- time and incentives to support classroom-relevant professional development opportunities for educators;
- time for planning effective integration into new and existing curricula;
- time for reviewing and evaluating new technologies and resources; and
- on-going financial support for a sustained technology infrastructure.
ICT education is an essential part of tertiary education to accomplish the above-mentioned factors. The goals of ICT training should not be limited only to students learning on how to use computers, they need to be prepared to integrate their use in everyday living as an integral part of their livelihood skills. These are teaching-educating-cognition complex goals that are broader than basic “how-to” computing.

New ICTs are introduced continuously, gradually rendering previous generations obsolete. The rapid evolution of technologies and associated disciplines has a profound effect on ICT education, affecting both content and pedagogy (ACM and IEEE, 2008, p.14). ICT education cannot cover all the rapid developments in modern computer science. Therefore, the goal is to integrate the fundamentals of computer and information science into general education, providing students with basic knowledge and skills to explore different fields of science, and prepare them for their future life and role in a knowledge-based society.

Compulsory ICT Training in tertiary education must be tightly linked to and be a continuation of the Informatics subject that is taught in secondary schools, so that ICTs can become a tool for other subjects. The training should prepare learners for advanced study and work, in response to labour market demands and for leading fulfilling lives. Upon completion of Compulsory ICT Training, students should, in our view be able to:

- understand essential facts, concepts, trends, needs and problems relating to ICTs;
- analyze the impact of technology on individuals, organizations and society, including ethical, legal and policy issues;
- apply this understanding to everyday life and lifelong learning activities;
- understand the essential facts, concepts, theory, practice and tools for an information system;
- identify and analyze requirements for developing information systems appropriately;
- understand the social, professional, and ethical issues involved in the use of ICTs;
- apply the principles of effective information management;
- operate computing equipment and applications effectively; and
- make effective multimedia presentations to a range of audiences.

For this study, we analyzed the implementation of the Informatics Curriculum Standard (MNCSM, 2004) in secondary education and compared its curriculum and content with ICT training in tertiary education. We also carried out a survey on ICT knowledge and skills among tertiary students.

Analysis of the implementation of the Informatics Curriculum Standard in secondary education

Informatics and computer training have been included as a subject in the secondary school curriculum in Mongolia since 1988. Since 2005, a number of activities have been implemented to enhance the Informatics Curriculum and delivery, such as development of standards, training of informatics subject teachers, development of training manuals and materials development. One of the most important steps, directed by the government to improve informatics training, was the development of the first standard for informatics education during 2000–2004. The implementation of the Informatics Curriculum Standard for Primary and Secondary Education (MNCSM, 2004) commenced from September 2005. There are five content domains: information, computers, algorithms, modelling, and information technology.
Each learning component in each particular domain is tightly linked with other content elements within the same domain and is also linked to components in other domains.

This standard has the following advantages (Uyanga, 2005):

- development of a standard that all secondary schools can use;
- focuses on competence-based goals;
- is based on systematic knowledge of informatics science;
- has a clear focus on students gaining knowledge and skills to use computers and other information technologies effectively and efficiently, to enable them to resolve issues encountered in the workplace;
- responds to the needs of both individuals and society;
- encourages informatics teachers to teach theoretical aspects as well as to develop the skills of students to use ICTs effectively;
- instructs informatics teachers to create the environment in which the standard is successfully implemented by supporting other teachers to widely use computers and other information technologies in their teaching;
- encourages interdisciplinarity;
- compatible with the international standards set by specialized international organizations for ICT education, such as the UNESCO/IFIP Curriculum - ICT in Secondary Education (UNESCO/IFIP, 2000), and ISTE National Educational Technology Standards for Students (ISTE, 2007); and
- independent of specific tools and types of information technology.

Although the Informatics Curriculum Standard for Primary and Secondary Education (MNCSM, 2004) was introduced in 2005, most secondary schools had not followed this standard. There are several reasons for this, including:

- shortage and high turnover of professional informatics teachers, in secondary schools, especially in rural areas, with most of the informatics teachers focusing on simple ICT usage, rather than on more complex tasks, such as programming;
- inadequate of teaching and learning materials that comply with the Informatics Curriculum Standard;
- insufficient computer and other hardware; and
- shortage of electricity in rural areas.

During the 2008–2009 academic year, we carried out a study of the implementation of the Informatics Curriculum Standard for Primary and Secondary Education (MNCSM, 2004). The objectives of the study were to:

1. analyze the implementation of contents specified in the Informatics Curriculum Standard; and
2. analyze content linkages of Informatics subject in secondary education and Compulsory ICT Training in tertiary education.

Focus group discussions and qualitative data analysis methods were used in this study. The study was carried out in 46 secondary schools (12 of them in rural areas), selected randomly.

The Informatics Curriculum in all the schools comprised computer basics, such as the Windows operating system, text processing (Microsoft Word), design multimedia presentations (Microsoft PowerPoint), use of spreadsheets (Microsoft Excel) and was in accordance with
the specifications of the *Informatics Curriculum Standard*. The study also confirmed that knowledge and skills defined in the information technology domain was offered to students. Other topics in the curriculum of most of the schools are shown in Table 1.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Coverage, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet usage</td>
<td>95.6</td>
</tr>
<tr>
<td>Image processing</td>
<td>91.3</td>
</tr>
<tr>
<td>Algorithms</td>
<td>86.9</td>
</tr>
<tr>
<td>Networking</td>
<td>89.1</td>
</tr>
<tr>
<td>Modelling</td>
<td>91.3</td>
</tr>
<tr>
<td>Information/Information systems</td>
<td>65.2</td>
</tr>
<tr>
<td>Information culture</td>
<td>21.7</td>
</tr>
<tr>
<td>Computer and information ethics</td>
<td>34.7</td>
</tr>
</tbody>
</table>

Table 1. Curriculum coverage of Informatics subject in secondary schools

Standard contents such as service applications and database management were not included in the curriculum in any of the 46 schools. A few schools still offered non-standard contents: programming (30.4%), web technology (15.2%) and publishing (17.3%). Regarding programming, the survey showed that schools were using languages such as C+ and Pascal.

Analyzing the Informatics Curriculum, it can be concluded that implementation of the *Informatics Curriculum Standard* was not satisfactory. Especially at a time when rapid ICT development is having great impact on daily life activities, it is necessary to deal with issues relating to ethical norms of handling computers and information. We found that computer and information ethics was studied only by slightly more than one third of the schools surveyed (16.7% of rural schools and 41.2% of Ulaanbaatar schools), while information culture was studied by 21.7% (16.7% of rural schools and 23.5% of Ulaanbaatar schools). Information and information systems were studied in 65.2% of the schools surveyed (25.0% of rural schools and 79.4% of Ulaanbaatar schools). The study also revealed that the curriculum coverage of contents for the information domain was not the same in urban and rural schools.

In our curriculum analysis, we found that all schools included relatively well, the contents of computing, algorithms, modelling and information technologies in their Informatics Curriculum, and this was in accordance with the *Informatics Curriculum Standard*. However, some contents in the information domain were not fully included in the curriculum.

As described in the *Informatics Curriculum Standard for Primary and Secondary Education* (MNCSM, 2004), each component in a particular domain (information, computers, algorithms, modelling and information technologies) should be tightly linked with other content components within the same domain and linked with those in the other domains. However, the curriculum of each schools was divided into domains and most of the informatics teachers were teaching Informatics by domain. This gave rise to poor linkages between the separate contents, which in turn resulted in students’ failure to combine and see the “whole” in their learning. This weakness negatively affected the ability of the learners to apply what they had learned in school to their needs.
Analysis of Compulsory ICT Training contents in tertiary education

ICT education of tertiary institutions must be comprehensive and aim to prepare students with high professional and research capacity for the specific fields of science, technology, society and humanities within the framework of training, research, production and services. It should be designed to develop knowledge, competencies and skills for self-development and culture.

ICT training at the tertiary education level was divided into compulsory and specialized ICT training and we examined both categories in our study. Compulsory ICT Training at tertiary level was offered under various names, such as introduction to computers; informatics; application programs; computer usage and applications. Compulsory ICT Training aimed to provide appropriate knowledge and skills for using ICT as a tool in future learning activities. However, there was no common standard for Compulsory ICT Training for tertiary education. The subject contents concentrated on the basics of computers and application programs. Therefore, there was a need to refine the ICT curriculum and its contents for each scientific branch of professional training, so as to prepare students for the next phase of their careers.

We reviewed the ICT curricula of 33 tertiary institutions of Mongolia and the findings of our study are summarized in Table 2. Most of the institutions offered Compulsory ICT Training, comprising lectures and laboratory work, during the first academic year. Compulsory ICT Training comprised the basics of computers (the same as the curricula applied in all secondary schools). Modelling, human and computer interface, programming, applications for specific purposes, computer and information ethics were not included at any of the institutions.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Common in number of institutions</th>
<th>Common in % of institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basics of computers</td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Windows OS</td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Text processing</td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Multimedia presentation</td>
<td>30</td>
<td>90.9</td>
</tr>
<tr>
<td>Spreadsheet use</td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Image processing</td>
<td>16</td>
<td>48.5</td>
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<tr>
<td>Databases</td>
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<tr>
<td>Web technology</td>
<td>14</td>
<td>42.4</td>
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<tr>
<td>Service applications</td>
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<td>Human and computer interface</td>
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<td>0</td>
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<td>Algorithms</td>
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<td>3.0</td>
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<tr>
<td>Programming</td>
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<td>0</td>
</tr>
<tr>
<td>Internet usage</td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Modelling</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Computer and information ethics</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Publishing</td>
<td>2</td>
<td>6.1</td>
</tr>
<tr>
<td>Networking</td>
<td>3</td>
<td>9.1</td>
</tr>
<tr>
<td>Applications for specific purposes</td>
<td>1</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Table 2. Curriculum of Compulsory ICT Training
Our comparative analysis of the contents of the Informatics subjects in secondary schools with Compulsory ICT Training in tertiary institutions, revealed the data presented in Table 3.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Informatics (secondary education)</th>
<th>Compulsory ICT Training (tertiary education)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer basics</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Windows system</td>
<td>97.8%</td>
<td>100%</td>
</tr>
<tr>
<td>Internet usage</td>
<td>100%</td>
<td>97.1%</td>
</tr>
<tr>
<td>Office applications</td>
<td>97.8%</td>
<td>100%</td>
</tr>
<tr>
<td>Spread sheets</td>
<td>87%</td>
<td>100%</td>
</tr>
<tr>
<td>Multimedia presentation</td>
<td>97.8%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3. Comparison of ICT content in secondary and tertiary education

Students had previously learned the same topics in the Informatics Curriculum in their secondary education. As the content of these topics at the universities were at the same levels as the secondary schools, without any linkages or improvements, there did not seem to be any added value. Similar to the secondary level, there were no apparent linkages between the different domains in the tertiary Compulsory ICT Training. There was thus a need to reorganize the Compulsory ICT Training in tertiary institutions, to become a direct continuation of the Informatics Curriculum in secondary education. The curriculum at tertiary level should also be reorganized to incorporate relevant informatics for other subjects, e.g. special statistics packages in the teaching of statistics. Specialized ICT courses were offered after the Compulsory ICT Training, depending on majors. They aimed to prepare students for careers in information technology. For example, courses such as programming languages, databases, systems analysis and design, formal methods, and networking were offered for computer science majors. Linear programming, systems analysis and design, mathematics programming and similar courses were offered to students majoring in mathematics.

Survey on ICT knowledge and skills among tertiary students

One of the main indicators of the implementation of the Informatics Curriculum Standard for Primary and Secondary Education (MNCSM, 2004) is ICT knowledge and skills of new undergraduate students enrolled from secondary schools. We set out to measure compliance with the Informatics Curriculum Standard by carrying out an analysis of ICT content linkages and we also tried to evaluate the implementation of the Informatics Curriculum Standard by assessing the knowledge and skills acquired from the Informatics subject in secondary schools. With those research data in hand, we then collaborated with the School of Computer and Information Technology (SCIT) of the Mongolian State University of Education (MSUE) in the next stage of the research. SCIT-MSUE prepares teachers of mathematical and general informatics. We distributed a questionnaire to all the 150 SCIT-MSUE students who were enrolled in the Compulsory ICT Training. A total of 121 valid samples were returned. Of those students, 71% (86 students) had graduated from secondary schools in rural areas, 29% (35 students) were from Ulaanbaatar schools, 64% had studied informatics in their secondary education and 36% had not. The results showed that the implementation of the Informatics Curriculum in secondary schools was not satisfactory and some schools did not offer Informatics education. Their reasons were mostly related to the lack of informatics teachers, computers
and electricity. All of the students who studied Informatics answered that they could use the Windows operating system and 83.1% could use Microsoft (MS) Word, 63.6% MS Excel, 12.9% MS PowerPoint, and 5.1% image processing and publishing.

Conclusions and recommendations

The main research findings of our project research are:

1) Since 2005, a number of activities were implemented in secondary schools to enhance the Informatics Curriculum, such as development of a standard, training of informatics subject teachers and development of training manuals and materials.
2) The comparative analysis of the contents of the Informatics subject in secondary schools and the Compulsory ICT Training at tertiary institutions showed there were similarities in coverage.
3) This common content was still at the same level in both secondary and tertiary education, without any linkages or improvements. This meant that instead of imparting appropriate knowledge and skills for using ICTs as tools for future careers or advanced studies, Compulsory ICT Training concentrated merely on basic computer knowledge and simple use of ICTs.
4) The organization of informatics content varied due to the differential knowledge levels in the schools and universities, in terms of the capacity of teaching staff and access to ICT services. The teaching of the Informatics subject did not fully adhere to or reflect the Informatics Curriculum Standard.
5) Although the subject was covered within the curriculum, most students had gained little solid informatics experience to assist them with their tertiary studies.
6) ICT education, neither at secondary schools nor tertiary institutions kept pace with the rapid developments in ICTs.
7) Compulsory ICT Training aimed to provide appropriate knowledge and skills to use ICTs as tools in future learning activities. But the contents of Compulsory ICT Training were not oriented to preparing students for applying ICTs in advanced studies and/or for their careers.

8) There was no standard curriculum nationwide for Compulsory ICT Training at tertiary level, and we recommended that this issue be addressed.

9) Basic ICT knowledge and skills obtained from secondary education differed greatly among individual students. This was one of the major problems faced in organizing Compulsory ICT Training.

10) The lack of proper management of Compulsory ICT Training had adverse impacts on specialized ICT training and use of ICTs in other subjects.

Compulsory ICT Training in the tertiary education system of Mongolia did not have any content linkages with the Informatics Curriculum in secondary education and it simply repeated the content. Therefore, we recommended that the university Compulsory ICT Training should be based on international standards and build its contents from the secondary school Informatics Curriculum, taking into account, the curricula of other subjects in tertiary education. This recommendation was adopted by the Ministry of Education, Culture and Science in the Ministerial Decree A/241, dated May 16, 2012 (copied below). The Box below contains further details of the decree. In order for students to enter universities with a minimum level of ICT knowledge and skills, the teaching of Informatics at the secondary level must comply with the national standard. Only if this is done well, will it be possible to gain the full benefits of the new standard for Compulsory ICT Training in tertiary institutions as a direct continuation of the Informatics in secondary education. As well, we saw a need to incorporate ICTs in the teaching of other subjects at the university level, and to link ICT education with the other disciplines.
МОНГОЛ УЛСЫН
БОЛОВСРӨL, СӨЭЛ, ШИНЖЛЭH УХАННЫ
САЙДЬНЫ ТУШЛАЛ

"Болохсөрөл" хуулийн 11 дүгээр зүйлээс 11.2 дахь хээргээ, 28 дүгээр зүйлээс 28.14 дах залалт. Болохсөрөл, сөёл, шинжлэх ухааны явнын нэгийн дарга нарын 2012 оны 4 дүгээр сарын 30-ны өдөр 10 өдөр болон 1 тус үндэслэлд ТУШЛАЛ


Ойд платформын түүх хичээлээг сонгох хичээлээг жагсаалт товч заавал судлах хичээлээг жагсаалт оруулал.

4. "Оюуны эмчийн зүйлээ" хичээлд зөвлөж сонгох судлах нийтээ хичээлэг жагсаалт нэмэх.

5. "Оюуны эмчийн зүйлээ" хичээлд судлагаахууны хүрээс дүүрэг байдлаар тогтоох.

6. "Оюуны эмчийн зүйлээ" хичээлд зөвлөж сонгох судлах нийтээ хичээлэг жагсаалт нэмэх.

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30. "Оюуны эмчийн зүйлээ" хичээлд судлагаахууны хүрээс дүүрэг байдлаар тогтоох.
Ministerial Decree A/241 dated 16th May 2012

Ministerial Decree A/241, dated 16th May 2012 of the Ministry of Education, Culture and Science approved amendments to the standards for higher education. It made several amendments to the standards for the following subjects: Mongolian history, intellectual property and information technology and information systems. It specified the following topics of information technology and information systems to be studied as Compulsory ICT Training at the tertiary level:

- Basics of ICT
- Introduction to ICT development
- Introduction to information systems
- Information technology
- Document processing
- Spreadsheets
- Digital image processing
- Multimedia presentation
- Databases
- Web technology
- Internet and networking

All contents detailed under each topic, except Basics of ICT, exactly reflect the policy recommendations made by the project researchers to the Ministry of Education, Culture and Science. The decree was disseminated to all universities in Mongolia, which must now adhere to the standards specified in it.

Details of Ministerial Decree A/241, setting the standard for Compulsory ICT Training at tertiary level.
Source: Amarzaya Amartuvshin

References


Livestock farming by nomadic herders, always weather-dependent, remains the predominant rural livelihood in Mongolia. The project described in this chapter aimed to respond to herders’ demand for more timely and accurate localized weather forecasts as a means to reduce risks and improve planning of key livelihood activities. Extension of information and communication technology (ICT) services to remote parts of the country made experimentation with new communication systems feasible. The project started with a needs assessment, which found that the top priority of herders was to obtain three day weather forecasts for temperature, precipitation and wind speed. There was mobile coverage in 80-90% of the land area and most herders had mobile phones (except for the poorer households). The network quality differed by community, with mostly poor reception in high mountain areas. A mobile phone, in combination with a fixed telephone connected to an antenna, allowed herders to receive forecast data and phone the sum centre or the office of the Mongolian non-government organization, Environment and Development Association (JASIL) to give feedback on forecasts received and to transfer their own weather observations. The transmission system established in this project incorporated the existing local weather stations and the weather observation unit in the sum centres. In discussions with community members, they expressed the view that their pasture management practices improved, such as better pasture selection. They also gave details of how the new weather system contributed to social, health and ecological improvements in the communities where it was piloted.
Introduction

Traditionally, Mongolian herders depend on the weather as they move from season to season with their animals and belongings. (Box 1 summarizes winter conditions from 2009 to 2013.) Their livelihoods depend on the sound management of livestock and the natural resources that sustain their animals. Since the early 1990s, Mongolia has transitioned from a Soviet-dominated regime to democracy and a free market economy, accompanied by a reduction of state presence in many domains. Following the transition, Mongolian pastoral livelihoods have become much more exposed to three interrelated forces: natural resource degradation, in particular of grasslands and water, rapid societal change and climate change (Vernooy, 2011). One form of adaptation to changes in livelihoods is known as co-management, in which herder groups work together with government agencies to better manage the natural resources. Introduced in Mongolia in the early 2000s, valuable lessons about adapting co-management to local conditions have been learned (Ykhanbai, 2011).

Early warning information in the form of various types of useful weather forecasts that are community specific can assist herders to make better informed and less risk-prone decisions concerning their everyday livelihoods. Appropriate localized forecasts could also lead to considerably less disastrous impacts of the extreme winters, known as dzuds and of reduction of ex post-dzud recovery efforts and expenditures, which, in recent decades have been enormous for Mongolia (Vernooy & Erdenechuluun, 2011). Until 2010, however, Mongolia did not have such a localized weather forecasting system. Mongolia’s National Agency for Meteorology and Environmental Monitoring (NAMEM) has provided forecasts up to the sum level, but not to the community level. Considering the wide variability of community level conditions, herders have for a long time expressed the need for more localized weather information.

Following the disastrous dzud of 2009-2010 (NSO, 2011), with heavy livestock losses, Mongolia experienced more regular winters which allowed herders to recover from those losses. Herds across the country have increased rapidly, from 32.7 million in the summer of 2010 to 43.1 million at the end of 2012. According to herders across the country, the 2011-2012 winter season was regular. The summer of 2012 was very wet, contributing to abundant growth of grasses and steady recovery of animal weight. The 2012-2013 winter however, was very cold, causing some difficulties for animal husbandry. According to the herders at the project sites, thanks to the use of localized weather forecast data, loss of livestock was reduced by 95% during the project period (measured at the beginning of 2013 and compared to the 2011-2012 winter); haymaking increased by 45% on average. At one of the project sites, Ikhbulag community, animal numbers increased more than 35% during the project period.

Box 1. Weather in Mongolia, 2009-2013

The project

In 2010, a team of researchers, meteorologists and herders, led by JASIL, joined forces in a pilot project to do something about the lack of localized weather forecasting in the country. This team proposed a unique collaboration between JASIL, NAMEM and the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES), based in
Bangkok, Thailand. Based on a tripartite agreement between the three organizations, RIMES committed to providing, through daily email transfers, location-specific weather forecast data (WFD) for plots of 9x9 km coverage in three selected communities (pilot sites) in different ecosystems of Mongolia. Hitherto, RIMES had not had the capacity to experiment with providing localized weather forecasts on its own. The team began to test the hypothesis that ICTs can play an important role in agricultural and livestock production and increase rural livelihood resilience through improved risk management at the household and community levels. The team focused on three interrelated aspects: the effective use of ICTs for development, the production of useful localized weather data and the improvement of herders’ livelihoods (JASIL, 2011). Building on a decade of previous research and policy development efforts by JASIL to introduce and mainstream co-management of natural resources, in particular grasslands (Vernooy, 2011; Ykhanbai, 2011), research and pilot testing were carried out at three pilot study sites:

a) Ikhbulag community of Khotont sum, in Arkhangai aimag, representing the steppe-forest ecosystem;
b) Karatau community of Deluin sum, in Bayan-Ulgii aimag, representing the mountain and steppe dry ecosystem; and
c) Aduunchuluun community of Lun sum in Tuv aimag, representing the steppe and prairie ecosystem.

Karatau community meeting. Photo by Y. Erkin
In October 2010, the project team initiated the process of introducing their plan at the sum and community levels, starting in Ikhbulag, followed by Aduunchuluun and Karatau. The team carried out a needs assessment among herders at the three sites to identify in a precise way, how to most effectively set up the new system. Ikhbulag community members were the first to identify requirements for weather forecasts adapted to local needs. They based their requirements on the regular annual schedule of nomadic lifestyle tasks, which follows a similar pattern across the country, as shown in the table below. Community members also identified the main weather forecast variables of interest: temperature, precipitation and wind speed, which they required three times per day, in a simple format. They then discussed and agreed upon the intended use of the weather forecasts, the recording of their own localized weather data (type, frequency, format), and the monitoring activities required of themselves for an effective new weather forecasting system. The herders at all the three sites ranked forecasts of three day lead time and a frequency of three recordings per day as the most valuable. After their deliberations, the community members agreed upon a division of tasks and a work plan for a one-year trial period (Ykhanbai, et al., 2011a).

<table>
<thead>
<tr>
<th>Livelihood activity</th>
<th>Timing</th>
<th>Lead time of forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparing for Tsagaan Sar (White Moon) festival</td>
<td>February</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Celebrating Tsagaan Sar</td>
<td>February</td>
<td>1-3 days</td>
</tr>
<tr>
<td>Preparing for the delivery /arrival of baby animals</td>
<td>February–March</td>
<td>5 days</td>
</tr>
<tr>
<td>Delivering baby animals</td>
<td>March 26–June</td>
<td>1-3 days</td>
</tr>
<tr>
<td>Combing goats and cattle</td>
<td>May</td>
<td>1-3 days</td>
</tr>
<tr>
<td>Preparing dairy products</td>
<td>June–September</td>
<td>Several days</td>
</tr>
<tr>
<td>Shearing sheep wool</td>
<td>July</td>
<td>1-3 days</td>
</tr>
<tr>
<td>Moving with livestock to summer camp</td>
<td>July</td>
<td>5 days</td>
</tr>
<tr>
<td>Picking fruits and herbs</td>
<td>August</td>
<td>5 days</td>
</tr>
<tr>
<td>Moving with livestock to autumn camp</td>
<td>August</td>
<td>5 days</td>
</tr>
<tr>
<td>Shearing lamb wool</td>
<td>August</td>
<td>1-3 days</td>
</tr>
<tr>
<td>Preparing hay and fodder</td>
<td>August–September</td>
<td>5 days</td>
</tr>
<tr>
<td>Making felt</td>
<td>August–September</td>
<td>1-3 days</td>
</tr>
<tr>
<td>Harvesting vegetables</td>
<td>September</td>
<td>5 days</td>
</tr>
<tr>
<td>Fixing and building (new) fences</td>
<td>September–October</td>
<td>5 days</td>
</tr>
<tr>
<td>Preparing fuel and firewood</td>
<td>October</td>
<td>Several days</td>
</tr>
<tr>
<td>Moving with livestock to winter camp</td>
<td>November</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Preparing and repairing the animal shelters</td>
<td>November</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Warming up the ger</td>
<td>November</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Preparing winter meals</td>
<td>December</td>
<td>3-5 days</td>
</tr>
</tbody>
</table>

Herders’ forecast requirements in terms of lead time (Ikhbulag community).
Source: Adapted from: Ykhanbai, et al. (2011a)
The new forecast system

After careful consideration of possible architectures of the ICT system, taking into account the annual calendar of movements, the annual schedule of tasks, the local geographic conditions, and the existing ICT system at sum and community levels, the team, together with the NAMEM staff and community members designed the first locally adapted data transmission system. For each of the three pilot sites, a particular architecture was designed and tested. The team studied an earlier example of an ICT system in the Govi (Gobi) region and made good use of its lessons learned (Wang & Vernooy, 2012). Notably, the team adopted the use of a single fixed phone to serve as a community-level transmission station.

Once a day, in the morning, the RIMES three day weather forecasts were transmitted via email from Bangkok, to the NAMEM and JASIL offices in Ulaanbaatar. From these offices, forecasts related to the hours 0800, 1400 and 2000 were given. These were the times indicated by the herdiers as being the most useful in terms of every day decision-making of their activities. The data were transmitted to the three sites, using email for Lun and phone for Khotont. For Deluin, SMS group messaging from the JASIL office was used as the only viable alternative. For the sites in Lun and Khotont sums, group messaging was also used for back-up. In the cases of Lun and Khotont, the data went to the NAMEM office/station in the sum centres, and from there by telephone to a focal or nodal weather herder in the pilot communities who was equipped with a fixed phone. The focal weather herder used a mobile phone to inform each of the herdiers in the community on a daily basis. At all three sites, herdiers also used the
traditional way of relaying information from herder to herder on horseback, depending on daily activities and weather conditions. The focal weather herder also measured and recorded local weather variables for every six-hour period in a community weather log book, which was shared and reviewed together with the project team during field visits. In the case of Deluun, where local transmission was more difficult due to the high mountains, the RIMES data were transferred by email to the JASIL office in Ulaanbaatar every morning and from there by SMS group messaging directly to herders in Deluun, to the sum governor’s office and to the NAMEEM office.

In order to assess the quality of the data and the model used by RIMES, the team designed two parallel data verification practices. At the community level, herders agreed to carry out daily weather recordings based on simple recording tools, using the same weather variables. To implement this, the research team provided the basic equipment and training in its use. The equipment consisted of a time-based thermometer, a precipitation measuring device, a barometer and an automatic multipurpose meteorological device (Ykhanbai, et al., 2011b).

NAMEEM staff compared RIMES data with the data generated by NAMEEM for its national network of sum level weather stations over a period of one year. After one year of trials, according to the NAMEEM Ulaanbaatar staff interviewed, the RIMES data were reasonably accurate, in summer more so than in winter. Herders commented that they found the RIMES data good and useful, although they did observe certain variances between the forecasts and their own measurements. Herders did not seem so concerned about the absolute
Mobile phone density in Mongolia has surpassed 100% of the population. In Ulaanbaatar, many people own more than one mobile phone, inserting a SIM card from different carriers in each one to take advantage of the varying rates offered by the major communication companies (G-mobile, Unicom and Unitel). In the rural areas, many herders too, have mobile phones. However, connectivity remains a problem, particularly in the more remote mountainous areas. From any particular sum centre, transmission range varies from 30-80 km; in the mountainous areas (which cover most of the country), the range is often shorter. Mongolia’s extremely cold winters cause additional problems and power failures are common during the winter seasons. Vehicle batteries are used to charge fixed and mobile phones in the communities and herders increasingly make use of solar power to generate electricity to power batteries. Solar panels have become very popular and many herders have installed them outside their gers. Sometimes, however, cloudy weather periods prevent the generation of electricity from solar power. During times of moving to a seasonal pasture, power generation is difficult and connectivity generally becomes a problem as herders move outside mobile coverage areas, particularly in far away pasture places, notably for the Karatau community’s summer pastures and the Aduunchuluun community’s winter pastures.

Box 2. ICT use and challenges in pastoral areas
The pilot project not only established a novel and unique system to deliver localized weather forecasts, but also led to the building of a new two-way relationship between NAMEM and the herders, thus demonstrating how a more integrated and dynamic national weather system could operate. The JASIL team played the very important role of co-ordinator and facilitator in this process. Herders expressed appreciation for the new weather data, which they integrated without much trouble into their existing weather observation practices, based on a large number of traditional indicators, ranging from the “colours” of the mountains (forest and pasture vegetation) and animal behaviour, such as the ways in which rodents build their winter homes. NAMEM staff realized the importance of accurate localized weather forecasts for herders across Mongolia, acknowledging the limited usefulness of aimag and sum data and the serious shortcomings in the existing weather forecasting system. They also developed respect for the herders’ capacity to become qualified, scientific, local weather readers.

The use of the weather forecast data in every day herder livelihoods

At all three sites, herders made good use of the weather forecasts, both at household and community levels. The most striking feature was that they were able to improve their decision-making for key livelihood activities throughout the seasons. The fact that they had accumulated several years’ experience of working together for natural resource co-management, a concept they learnt in an earlier project, certainly worked in their favour for both household and community decision-making.

Men mainly used the WFD to optimally organize the herding of animals, select pastures, set movement dates and travel to the sum and aimag centres. Women used the WFD to better regulate cooking and heating in the home, to receive and feed young animals, provide clothing to family members, set time for milking, product processing and drying and activities related to growing vegetables. Children used the WFD for looking after young animals, collecting animal dung and other types of fuel, dressing for and returning home from school, and playing. Elders in the communities used the WFD to travel more regularly to clinics to check their health (e.g. blood pressure) and to make recommendations and suggestions for herding of animals.

Ms. Solongo, the focal weather herder from the Aduunchuluun community in the dry steppe region of Lun sum explained, in an interview with R. Vernooy in 2012:

_We are very satisfied with the new system and wish that it continues to function. We use the forecasts not only in our community, but more and more herders from neighbouring areas are calling us to obtain the localized weather forecasts. In Aduunchuluun, we are using the forecasts for every day herding of animals, milking, and milk processing. We also use them for pasture selection; when it is either very hot or very cold - we would then keep the animals closer to home. Last autumn, we started more timely repairs of winter animal shelters._

At the community level, herders made multiple uses of the forecasts. Ms. Solongo gave a few examples: “_We use the forecasts for the timing of pasture rotation, planting and harvesting of crops, making hay and fodder, and our seasonal movements_.” Herders expressed that their decision-making had become more precise. Prior to the delivery of localized weather forecasts, they had to rely on aimag level data, which often were not adequate. For example, every day pasture selection was always approximate. Herd movements were planned by guessing weather patterns and movements so that cold, rainy, snowy and windy days usually brought about some animal losses. Haymaking was often delayed due to unforeseen unfavourable weather. In Lun sum, NAMEM
staff started using the Aduunchuluun community weather forecast as fairly reliable data for the whole sum. The Lun sum governor confirmed the positive feedback from the herders, expressing his strong interest in expanding the system to all communities in the sum.

The use of the new system extended beyond the weather forecasts. The herders benefitted by other frequent exchange of information, for example, in organizing their children to walk to school together, travelling together to the sum centres and other places, and obtaining information about the prices of goods at the sum centres and even at the capital city.

**Prevention is better and far less expensive than post-disaster recovery!**

To recover from the disastrous dzud of 2009-2010, still fresh in the memories of most Mongolians, the government requested international donor agencies to provide USD 18.15 million in the form of emergency and post-dzud recovery support. The government itself allocated more than USD 4 million during the winter months (United Nations Mongolia country team, 2010). It was calculated that the herders lost a total of nine million livestock, worth several hundred millions USD. Many households lost up to 80% of their herds. In normal years, the percentage loss is around 2%. Herders at the pilot sites reported a significant reduction of animal losses compared to previous years and there was zero loss in the 2011 winter and spring months. This could be partly explained by the relatively milder weather conditions, compared to the 2009-2010 winter, as well as a general improved level of preparedness, which had been observed in many regions of the country (Vernooy & Erdenechuluun, 2011). But herders at all three sites also attributed the much improved survival rates to the use of the localized weather forecasts (Ykhanbai, et al., 2012). Similar to herders across Mongolia, the herders at the pilot sites started preparing climate risk management plans after the 2009-2010 dzud. In addition to NAMEM’s regular seasonal forecasts, they had access to localized weather forecasts.

**From local pilots to a national system**

The project presented in this chapter has laid the foundation for a national system that can greatly improve the livelihoods of herders through more precise ex ante decision-making and planning, and also generate considerable savings in terms of avoiding or reducing ex post-disaster recovery time, efforts and expenses. From a technological perspective, the new system did not require much maintenance, other than care and regular control of the functioning of the ICTs and the weather measuring equipment. Of course, keeping the systems operational would also require the effort of the communities and the timely payment of telecommunication bills by all actors involved. Organizationally, herders seemed very capable to continue the new system and had in fact already begun, on their own, to expand the weather forecasting system to neighbouring herders.

According to the NAMEM staff, in the near future, NAMEM would be able to generate as many localized weather forecasts as requested by communities; and, according to the same interviewees, more accurate than the ones provided by RIMES. The new super-computer purchased in 2011, with faster and more data processing capacity, would enable this. In line with NAMEM’s mandate, it could be deduced that the costs of setting up and maintaining a national-level localized weather forecasting system, at least the data generation component, should be borne by the Mongolian state. With regards to the daily delivery of hundreds or even thousands of localized weather forecasts, a number of options could be envisaged. One option is that the Mongolian state bears the costs, in other words, the service would be delivered upon demand and costs borne by the state. Another option would be a user-pays system. The JASIL team asked herders at the pilot sites if and how much they would be willing to pay for continued
delivery of localized weather forecasts. Many of them answered that they would be willing to pay, at least a part of the costs. The average contribution figures given by them ranged between 500-1,000 Mongolian tugriks (USD 0.35-0.72) per month. Such a contribution to costs would make it a subsidized service, which would be a third option. The piloted weather forecasting system itself could be managed in a variety of ways. One option would be for NAMEEM to set up a specialized department. Another option would be that one or more of the ICT companies offer this as a service (Ykhanbai, et al., 2012a). A third option would be that the role could be undertaken by one or more civil society organizations (Vernooy, 2012).

The results of the project laid the foundation for a national Mongolian system that could greatly improve the livelihoods of herders through more precise ex ante decision-making and planning, and also generate huge savings in terms of avoiding or reducing ex post-disaster time, efforts, and expenses (Vernooy, Ykhanbai & Tsogt, 2013).

The organization of herders into co-management groups would take time and effort, but once operational, these groups could serve as efficient and effective two-way weather information transmission channels, as the pilot indicates. The pilot experience suggests that an effective localized weather forecasting system using ICTs facilitates and strengthens interaction and cooperation among herders. This leads to the hypothesis that the scaling up of co-management in general could be made easier through the adoption of effective localized weather forecasting systems based on ICTs. In order to facilitate the scaling up of the pilot experiences, the JASIL team developed a manual in Mongolian, titled, *Community guideline for localized weather forecast data use, transfer and observation*, based on the lessons learned from the three pilot sites. As Internet-enabled smartphones and higher speed data networks become accessible and affordable in remote areas, the system could become more efficient through use of the Internet.
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Urbanization, intensified by mining has been affecting the Mongolian Govi (Gobi) desert since the early 1990s. Mining provides employment and market opportunities, along with dramatic destructive impacts on the environment. Because of harmful activities of some mining companies and illegal miners, there is increased public awareness and conflicts.

This chapter introduces research findings from an information system project, My Homeland, deployed in a remote rural area, the Nomgon sum of the Umnugovi (South Gobi) aimag. The research approach was based on the concepts of grievance resolution mechanisms, system analysis and design and multi-agent system simulation.

My Homeland was developed as a prototype system, designed to demonstrate the benefits of sharing information among the stakeholders to prevent conflicts, particularly on the use of land and other resources, and finding solutions collaboratively to prevent environmental degradation and pollution.

In implementing and operating the system at the pilot site, capacity-building and institutionalization were accomplished by establishing a multi-stakeholder steering committee, and the active participation of a secondary school and a community-based organization in Nomgon.

The main finding of the research and development activities associated with this project is that a collaboratively managed grievance mechanism, supported by an information system like My Homeland can facilitate mitigation and alleviation of conflicts arising from land use, and environmental and social problems caused by mining.

The simple and affordable system was developed on a Linux-based Ubuntu 9.04 platform, with free open source servers for web, database, file and messaging applications.
Introduction

Mongolia is a country of nomadic origin and culture. Herding of livestock grazing on the vast pastures has been fundamental to the Mongolian economy, culture and identity for thousands of years. But intensified mining since the early 1990s has resulted in damage to the natural ecosystems, reduction of pasture land and pollution of the environment. These problems have been driving changes to traditional herding lifestyles and livelihoods of herders.

The research and development (R&D) project presented in this chapter aimed at exploring ways in which these issues can be addressed, including investigation of the root causes of problems and conflicts among three main groups of mining stakeholders in the Mongolian Govi – herders, mining companies and local governments. The project designed, developed and tested an information system for these parties, to facilitate their communication, collaboration and grievance management. The rationale for this project is introduced below.

Intensified mining in Mongolia

Mongolia is rich in mineral resources, including gold, silver, copper, coal, molybdenum, iron, oil and gem stones. Mining has intensified since the early 1990s and in 2010, it contributed 22.7% of the gross domestic product (GDP) (NSO, 2011). This sector’s contribution to GDP increased 2.5 times between 2001 and 2010, while agriculture including animal husbandry and crop farming decreased 2.7 times since 1996. Since 2005, the mining industry’s share of GDP has been higher than the share of the agriculture sector (Figure 1).

Figure 1. GDP share of agriculture and mining industry, Mongolia, 1989-2010. Source: Mongolian Statistical Yearbooks (NSO, 2004, 2008, 2011)
The Government of Mongolia has followed a policy of intensifying mining as a valuable source for national development, and the local governments have implemented the policy by permitting mining companies to use pasture land for mineral exploration, mining and construction of infrastructure, camps and other mining and industrial facilities. According to the Mineral Resources Authority of Mongolia (MRA, 2003), a total of 5,553 land lease certificates had been issued by 2003 for mineral exploration and mining (Figure 2).

More intensified mining in the Govi

The Mongolian Govi is rich with natural flora, fauna and mineral resources. Nationwide mega-projects, such as Oyu Tolgoi gold and copper, Tavan Tolgoi and Ovoot Tolgoi coal mining projects are located in the Umnugovi aimag, while the Tsagaan Suvarga copper and molybdenum project is in the Dornogovi (East Gobi) aimag.

The ecology of Govi is characterized by its extreme and dry climate (with less than 100 mm of annual precipitation), lack of permanent surface water, very thin layer of fertile soil and scarce vegetation. Pastoral livestock husbandry has been the only sustainable livelihood source of the people in such a fragile system for thousands of years.
Conflicts between mining and pastoral livestock husbandry

Mining provides employment and development opportunities, along with dramatic destructive impacts on the environment. Since the early 2000s, large areas of pasture lands have been leased for mineral exploration and mining by the joint decisions of the central and local governments. This has occurred without prior notice to and/or consultation with the herders, who have used these lands for many generations as pastures for their livestock. Incompatible interests between the herders and mining companies on the use of pasture land and underground water resources, as well as a dramatic increase in air pollution from heavy vehicles in the Govi are the major causes of conflicts between them.

The herders consider that mining is temporary, ending when the mineral resources have been exhausted, while pastoral livestock husbandry is eternal in the Govi. They are concerned about the environment and natural resources, and complain about environmental degradation, which in some cases has not been addressed adequately by the authorities and mining companies.

Public awareness of the environment

Mining activities have resulted in the reduction of pasture land and water resources, and brought some changes to the traditional lifestyles of the herders. The environmental and social baseline studies, conducted since 2007 in the Umnugovi and and Dornogovi aimags have shown that some local people have accepted and adapted to changes, particularly young residents who expect opportunities for additional income and employment. But even they worry about their homeland, and are eager to know about planned mining activities, potential changes, benefits and negative impacts for them and their livelihoods. They also want commitments from the mining companies of compensation for negative impacts affecting them, and/or rehabilitation of the land so that it can be returned to pasture after mining closures (JEMR, 2008, 2009a, 2009b, 2010).

Because of harmful activities by some mining companies and illegal miners, there is increased public awareness concerning the degradation of nature and the environment across the country. This concern started at the individual rural community level and was then extended to initiatives at the sum and aimag levels, resulting in broad nationwide movements collaborating in a formal manner. Examples include the Mongolian Nature Protection Coalition, My Mongolian Land and United Movement of Mongolian Rivers and Lakes. International non-government organizations (NGOs) such as Asia Foundation, Conservation International, Nature Conservancy, Soros Foundation and World Wildlife Fund have been implementing projects for nature and wildlife conservation, environmental protection, institutional strengthening and development of responsible mining. These have been funded by the Asian Development Bank, Canadian International Development Agency, Japan International Cooperation Agency, Government of the Netherlands, United Nations Development Programme, U.S. Agency for International Development, World Bank and others. Unfortunately, conflicts have been rising, even becoming violent in some places (Snow, 2010).

Need for facilitation of communication and collaboration between the stakeholders

We formulated the hypothesis:

“The issues and conflicts can be prevented or reduced by collaborative efforts of all
stakeholders through grievance management, reliable business relationship and participatory and knowledge-based decision making.”

There is a need for facilitation of communication and collaboration between the stakeholders, and using a specially designed information and communication system could facilitate this process. But there are some difficulties. The government and mining companies are formal entities, settled in one location and with well-organized structures and communication capacities, while the herders live in individual families and are mobile, roaming with their livestock across areas stretching up to hundreds of square kilometres, and their informal communities are usually organized by neighbouring relatives. Even though the herders are administrated by local governments and are equipped with mobile phones, organizing and communicating with them on a regular basis is problematic.

Objectives of the study

The objective of the project, conducted in 2009, was to create and introduce to the local residents of Nomgon, particularly the herders, a prototype information system that would facilitate information sharing, dialogue and collaboration with mining companies and local governments. The purpose of the system was to find solutions for issues and problems faced, to prevent conflicts associated with mining in the Govi. Research was conducted at the different stages of the project.

To meet this objective, we developed My Homeland, a prototype information system, the first Mongolian system designed for managing environmental issues at the sum level for all stakeholders. Capacity-building and institutionalization for sustainable operation of the system at the local level was done through the establishment and active participation of a multi-stakeholder steering committee, comprising representatives of the sum, a rural secondary school and a community-based organization.

Structure of the chapter

This chapter presents the results of the case study conducted in Nomgon, outlining the development and piloting of the information system, My Homeland. It analyzes relationships between herders, miners and local governments, including potential causes of future conflicts between them. It introduces a research hypothesis and questions, questionnaire survey findings and recommendations for My Homeland, an information system designed for improved communication for multi-stakeholder collaboration and grievance management to avoid conflicts.

In the next section, we present the methodologies used in this project. This is followed by an introduction of the Nomgon sum. Results and discussions are presented next, followed by conclusions.

Methodology

The research approach is based on three concepts:

1) Grievance resolution mechanisms (IFC & MIGA, 2008; IFC, 2009);

2) System analysis and design (Whitten, Bentley & Dittman, 2001); and

3) Multi-agent system simulation (Etienne, Cohen & Le Page, 2002).
A grievance mechanism to address concerns and complaints of affected communities is an important pillar of the stakeholder engagement process, since it creates opportunities for companies and communities to identify problems and discover solutions together (IFC, 2009). System analysis and design is about problem-solving and computer applications (Whitten, Bentley & Dittman, 2001), while multi-agent system simulation is based on the following four concepts: i) the point of view of each stakeholder on the resources and the entities it manages; ii) the viewpoint, a spatial representation of a point of view; iii) indicators, a set of markers selected by the stakeholders to monitor the dynamics of the system; and iv) scenarios as prospective management rules to tackle the problems (Etienne, Cohen & Le Page, 2002).

*My Homeland* was developed using an object-oriented approach, unified modelling language and the PHP programming language. The system provides for front-end and back-end users, including administrator interfaces. The Internet connection was established via the Aiji Wireless Broadband Gateway CDMA 2000-1x EVDO, Apache web server, MySQL database server and Samba file server. An Openfire XMPP server and DHCP server were installed on the Ubuntu 9.04 server edition platform (JEMR, 2010).

The R&D activities were conducted in four stages:

1) Research, analysis and modelling of the pilot site, including its stakeholders and mine developments;

2) *My Homeland* system development, including hardware, network and software;

3) Local capacity-building and institutionalization of the information system operations; and

4) Reporting and follow-up activities, including technical and financial reports, workshops, seminars and presentations.

Participation of the local population included interviews, questionnaire surveys, roundtable discussions and official meetings at the Local Khural (local parliament), which had demonstrated understanding and support for technology innovation. The local environmental inspector and field mining engineer were involved in the inspections for compliance with relevant regulations at the mining sites. There were both collaboration and conflicts between local governments, communities and the mining companies regarding environmental issues.

Research, analysis and modelling were carried out with use of statistical data and findings of environmental and social baseline studies conducted by JEMR, a Mongolian consulting firm, in Nomgon during 2007-2008 (JEMR, 2008). Additional information from a questionnaire survey conducted by the research team (JEMR, 2009b) and business modelling outputs (JEMR 2010) were used.

A total of 138 people were surveyed with structured questionnaires. Each interviewee responded on behalf of his or her family and the respondents represented 17% of the total households in Nomgon. Socio-demographic characteristics of respondents included: 12% herders, 70% female, 22% younger than 25 and 35% between the age of 26-40. In terms of education, 39% percent had higher education, 35% high school, and 26% technical and vocational education (Figure 3).
References on international guidance and best practices informing this project, included the *Community Development Toolkit* for the extractive sector (ICMM, 2012), ISO 14000 series standards on environmental management system (MASM, 2005) and policies and guidance on grievance mechanism in the mine and community development context from the International Finance Corporation and the Multilateral Investment Guarantee Agency (IFC & MIGA 2008, IFC 2009).

The methodological framework is shown in Figure 4 and a glossary of basic terminologies used in this chapter is listed in the Appendix.

**Figure 3. Demographics of respondents**

**Figure 4. Mindmap of methodological framework for My Homeland research and development. By R.Oyun**

**Introduction of the pilot site — Emgenbulag bag of Nomgon sum**

Nomgon sum in the Umnugovi aimag covers more than 1,800 square kilometres and it has a population of more than 3,000, living in approximately 800 households, 77% of which rely on herding livestock on natural grassland pastures, with very traditional and nomadic lifestyles.

According to the Mineral Resources Authority (MRA, 2003), 58% of pasture land of this...
sum was leased to 34 companies, holding 68 licences that permitted use of this land for mineral exploration and mining. Most of the remaining 42% is protected by the state under the provisions of the *Small Govi Strictly Protected Area*, with some of it allocated for special use along the border, and less than 1% of the land is for the small sum centre and other use (Figure 5).

![Cadastral map of mineral exploration and mining licences, Nomgon. Source: MRA (2003).](image)

**Figure 5. Cadastral map of mineral exploration and mining licences, Nomgon. Source: MRA (2003).**

Illegal gold miners have been operating in Nomgon since the beginning of 2007 and as soon as one of them discovers a small gold deposit, they increase in numbers and run a temporary gold mining operation, sometimes involving the local people in their illegal mining activities. An increase in illegal gold mining might cause chaos and even more serious negative impacts on the nature and the environment. So, these potential risks must be considered in advance and prepared for adequately.

At the time of the study, there had been no critical issues, problems or conflicts in the sum, because mining was still at the exploration stage, with feasibility studies and planning. In the future, if several of those 34 companies holding the 68 licences start mining activities, the pasture land areas will be reduced, natural grasses and soil degraded and industrial water use increased, affecting wildlife, livestock and herders.

The more detailed study, with collection of baseline data, the questionnaire survey and involvement of local herders was conducted in Emgenbulag bag of Nomgon sum. In 2010, Emgenbulag had a population of 538, living in 153 herder households, which together managed 45,000 heads of livestock. The entire territory of the bag is used for pasture. Stakeholder viewpoints emerging from the study are detailed in the next section.
Stakeholders’ viewpoints

The primary interests of the stakeholders were analyzed in order to identify the relationships that could be facilitated by an information system. Mining companies were interested in generating income and profit from mining. The local government was in favour of developing the mining sector in the area, as an opportunity for increased land taxes, other taxes and royalties, local infrastructure improvement, employment, small and medium-sized enterprise (SME) development and poverty reduction. The herders also had an interest in mining, expecting an increase in income from the sale of livestock products, and/or as an opportunity for new types of work.

Both the local government and the herders had concerns about the natural environment, pastures and water resources. They were aware of air pollution, noise, illegal hunting by visitors, damage to the historical and cultural heritage, lack of respect for their residences, branching of earth roads and degradation, including desertification of their homeland. Miners were aware of government bureaucracy, private interests and illegal pressure from government officers, illegal mining within their leased areas and damage to machinery, facilities and other property from attacks by intoxicated or undisciplined people. These were considered the causes for conflicts (Table 1).

<table>
<thead>
<tr>
<th>Actors</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herders</td>
<td>• Increased sales of meat &amp; milk</td>
<td>• Pasture area reduction</td>
</tr>
<tr>
<td></td>
<td>• Employment opportunity</td>
<td>• Reduction of pasture resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Environmental pollution</td>
</tr>
<tr>
<td>Local government</td>
<td>• Increased income</td>
<td>• Environmental pollution</td>
</tr>
<tr>
<td></td>
<td>• Development opportunity (SME, Infrastructure)</td>
<td>• Pressure on public services</td>
</tr>
<tr>
<td></td>
<td>• Employment opportunities</td>
<td>• Increased complaints or conflicts</td>
</tr>
<tr>
<td></td>
<td>• Reduction of poverty and migration</td>
<td></td>
</tr>
<tr>
<td>Mine</td>
<td>• Profit</td>
<td>• Illegal mining on leased area</td>
</tr>
<tr>
<td></td>
<td>• Knowledge &amp; technology</td>
<td>• Conflicts with locals</td>
</tr>
</tbody>
</table>

Table 1. Opportunities and threats from mining

As shown in Table 2, the rights of the various stakeholders are set out in the legislation related to land use, environmental protection, mineral exploration and mining. Residents have the right to bring claims for compensation for damage to their property and health resulting from adverse environmental impacts, against the person(s) responsible for causing the damage.

<table>
<thead>
<tr>
<th>Actors</th>
<th>Law on Environment</th>
<th>Law on Land</th>
<th>Law on Minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citizens</td>
<td>To bring claims for compensation for damage to their property or health resulting from adverse environmental impact against the person(s) responsible for causing the damage.</td>
<td>To possess and use the land according to the purposes set forth in the contract.</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Legal rights of different stakeholders

Both residents and mining companies have to comply with environmental legislation and the terms and conditions in their land titles. The mining companies must pay fees, taxes and royalties, and comply with decisions by the government, local self-governing organizations, governors and the requirements of state inspectors and rangers, as shown in Table 3.

Table 3. Legal duties of stakeholders

The views and primary interests of different stakeholders are illustrated in Figure 6, which also shows their motivations for, and perceived opportunities and threats arising from mining. This model became a reference for the conceptual design of My Homeland information system.
Intensive mining motivation:
• Poverty: ~ 25%
• Migration: 36-107 persons annually
• ...

Potential issues:
• Potential threats to the vulnerable Gobi ecosystem
• Change of traditional lifestyle of nomadic herders
• Increased conflicts on land and its resources
• ...

Weakness:
• Policy & legislation
• Lack of knowledge & experience
• Governance & decision making
• Collaboration
• ...

Opportunities:
• Increased sale of meat & milk
• Employment opportunity

Threats:
• Pasture area reduction
• Pasture resources reduction
• Environmental pollution
• Conflicts

Area: 18,374.2 km²
Population: 3,075
Households: 779

Opportunities:
• Increased income
• Development opportunity (SME, Infrastructure)
• Employment opportunity
• Reduction of migration

Threats:
• Environmental pollution
• Increased complaint
• Pressure on public services

Exploration:
• 29 companies
• Area 53.4%
• 58 licences

Mining:
• 6 companies
• Area 4.4%
• 10 licences

Total:
• 34 companies
• Area 57.8%

Hypothesis:
Issues can be prevented or reduced by collaborative efforts of all stakeholders through reliable business relationship; and participatory and knowledge-based decision making.

Figure 6. Viewpoints on mining development in Nomgon by different stakeholder groups. By R. Oyun & Mendbayar Byamba
Communication and collaboration are solutions for win-win and conflict-free scenarios

A win-win scenario can be developed, based on the opportunities created by mining, to benefit local people and local development. Miners constitute a market for meat, dairy and other products produced by the herders, bakers and other local entrepreneurs. Mining companies can provide employment opportunities. Both suppliers and buyers need information on demand and supply. Mining companies introduce industry technology, pay land and water use fees, taxes and royalties to both the central and local governments, improve infrastructure, and through community support programs, they can improve health and education services.

The main finding of the research, analysis and modelling activities was the understanding of the information required by the different stakeholders. This guided the conceptual design of the system, which included the identification of functions to meet the information requirements. After six months of research work and complex modelling exercises, the basic finding of the project team was surprisingly simple, formulated as: **the role of technology is to facilitate communication for information exchange and collaboration between the users.** Stakeholders agreed that information exchange would be required to achieve a common understanding of mining activities and the impacts of mining on the local community and the environment and that collaboration would be necessary for finding solutions and addressing complaints. The grievance mechanism at the time of the study was limited, not operating regularly and inadequate for resolving conflicts to mutual satisfaction.

The mining companies were in favour of a custom-designed information system that could help them investigate local needs and get feedback on the adequacy and efficiency of their public relations, environmental and social programs. They expected that sharing information on mining programs and boundaries of the mining leases would make local people aware, enabling them to prepare for future changes.

Our findings from the study, questionnaire survey, interviews and formal and informal discussions with herders, mining company and local government representatives confirmed to us that local people, who are aware, can contribute to the protection of nature and their living environment. They can be active observers, informants and/or advisors, providing early warning about risks, negative impacts and possible solutions. They can also get feedback on issues, such as their concerns and warnings through this system.

Mine managers can obtain regular information and comments, thereby becoming aware of concerns from the locals, knowing about how their mining activities affect them and performing their environmental and rehabilitation responsibilities in ways that meet local resident expectations. Being aware of what issues and problems the local population faces in regard to the environment, the miners can find solutions and take measures before serious damage or conflicts arise.

The government can use the system for establishing participatory monitoring and inspection for the implementation of environmental protection plans and environmental monitoring programs, with active involvement of local residents and NGOs.

Such an approach can be named a **collaboratively managed grievance mechanism** and be helpful for solving complex problems and/or prevention of damages and conflicts, by providing a platform for sharing scientific, technological and traditional knowledge. Early warning
of potential impacts, damages and conflicts can facilitate understanding and collaboration, enabling timely and adequate preparedness and mitigation measures to be undertaken.

Before designing an information system for collaboratively managed grievances, we conducted a questionnaire-based survey on information sources, and information and training requirements among local residents. As illustrated in Table 4, the survey showed that the residents living in the sum centre had opportunities for obtaining information from a range of sources, including newspapers and the Internet, while herders had only television, radio and face-to-face interactions. Health and other issues, such as government budgets were of greater interest for the sum residents, while herders were more concerned about the environment and natural resources, but they were willing to learn more about how to protect their health in such a changing environment.

<table>
<thead>
<tr>
<th>Question</th>
<th>Nomgon sum centre residents</th>
<th>Countryside herders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Source of information</td>
<td>• Newspaper: 47.8%</td>
<td>Ranked by most frequent usage</td>
</tr>
<tr>
<td></td>
<td>• TV and Radio: 82.6%</td>
<td>• Radio,</td>
</tr>
<tr>
<td></td>
<td>• Internet: 8.7%</td>
<td>• Television</td>
</tr>
<tr>
<td></td>
<td>• Meeting and seminar: 41.3%</td>
<td>• Meeting and seminar</td>
</tr>
<tr>
<td></td>
<td>• From other people: 8.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Other: 2.2%</td>
<td></td>
</tr>
<tr>
<td>2 The most needed information</td>
<td>• Health: 52.2%</td>
<td>Ranked by importance</td>
</tr>
<tr>
<td></td>
<td>• Gov. budget, investment,</td>
<td>• Environmental rehabilitation</td>
</tr>
<tr>
<td></td>
<td>project: 41.3%</td>
<td>• Condition and use of natural resources</td>
</tr>
<tr>
<td></td>
<td>• Mining: 19.6%</td>
<td>(pasture vegetation, wild animals, surface and</td>
</tr>
<tr>
<td></td>
<td>• Land related information:</td>
<td>underground water, etc.)</td>
</tr>
<tr>
<td></td>
<td>10.9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Other: 2.2%</td>
<td></td>
</tr>
<tr>
<td>3 The most needed training</td>
<td>• Internet use: 44.9%</td>
<td>• Vocational training</td>
</tr>
<tr>
<td></td>
<td>• Vocational training for</td>
<td>• Training on health and safety</td>
</tr>
<tr>
<td></td>
<td>mining specialization: 19.6%</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Results from survey on information sources, information and training requirements

**My Homeland system development and implementation**

In general, at the time of the study, the remote areas of Mongolia had limited access to adequate information and technological resources, such as maintaining information and communication (ICT) networks, hardware and software. Demand for professional services for administration, operation and maintenance of information technology systems was relatively high, but there was a considerable shortage of information technology professionals, and as well, the capacity of the hardware was usually low. Therefore, we set the criteria for **My Homeland** to be as simple and affordable as possible. This was achieved with free and open source software, refurbished low capacity desktops and modular architecture that was simple to administer and expand. Minimum maintenance was another key criterion.
Infrastructure development included improvement of the hardware capacity of the secondary school computer lab, which was provided with a server and refurbished computers. A local network with Internet access via a Broadband Gateway Modem (G-Mobile EVDO Router Modem) was established. The infrastructure was built with the following activities:

- Hardware maintenance, installing the operating system (Zenwalk 6.0 Standard Edition GNU Linux) and Open Office 3.0 application software on 13 old computers;

- Establishment of a local network with cable wiring and block device setup;

- Installing and configuring servers (Apache Web Server 2.x, MySQL database server, Samba 3.x file server, Openfire XMPP server, DHCP server) on Ubuntu 9.04 Server Edition platform); and

- Configuring and establishing an Internet connection (Aiji Wireless Broadband Gateway CDMA 2000 1x EV-DO).

Zenwalk 6.0 Standard Edition GNU Linux is an operating system that is optimized for low-end hardware; the Ubuntu 9.04 Server Edition server administration is simple and has long-term support; and Open Office 3.0 has free office tools that provide most of the Microsoft Office functions. In remote rural areas, the CDMA 2000 1x EV-DO broadband data service was the cheapest solution for small and home office Internet usage.

The conceptual schema of the built infrastructure is shown in Figure 7.

![Figure 7. Infrastructure conceptual schema. By Mendbayar Byambaa](image)
The first pilot version of *My Homeland* was developed and tested in Nomgon. The system provided a dynamic web portal, front-end and back-end user and administrator interfaces. The home page screen shot is shown in Figure 8.

![Figure 8. Screenshot of the pilot *My Homeland* home page](image)

During the pilot phase, *My Homeland* had limited content and was only an example of an information system tool, rather than a system providing rich scientific, business or social contents for solving issues, problems or conflicts directly. It was a simple tool aimed at assisting relevant stakeholders to share information and collaborate.

The primary users of the system were local governments, mining companies and local residents, including herders. The system operator was a computer lab teacher at a rural secondary school, and the developers were JEMR staff, consisting of environmental researchers, system analysts, designers and programmers. A local multi-stakeholder steering committee and a community-based organization were jointly responsible for overall management and administration of the system.

The stakeholders were actively involved in research and training activities, provided information on how government regulation was implemented at sum and bag levels and listed information they required from the mining companies. The school computer lab teacher acquired the necessary skills to operate the system, and assisted others to use it. Local government officers, particularly the governor and environmental inspector provided information on land use, mineral exploration and mining activities, environmental restoration and problems, as well as information on policy and practical measures for protection of the natural environment and prevention of negative impacts.

From the mining side, a mine manager (engineer) was involved in the research and contributed with information about the mines that could be shared with the local government and residents, and informed other stakeholders how government regulation is implemented at operational mining sites.
JEMR’s environmental staff shared information on the nature and the environment with both mine employees and locals, and provided consultancy on how government regulation for environmental protection had been implemented in practice at the local level.

Institutionalization at the local level was crucial for ownership and regular operation of the developed system. The local government office and the secondary school were the only candidates to operate the system. The school, with its computer lab and the capacity of teachers and students was selected as the most appropriate local operator. To encourage public use of the system, a local information system steering committee was officially established through a resolution by the Nomgon governor. A local NGO was established, with members representing the government, Local Khural, the school, local businesses and the herders. This NGO chaired the Steering committee.

Policy level discussions on the research findings and My Homeland information system development were arranged at the National ICT4D Seminar and its session on ICT4 Environment, held on January 26, 2010 in Ulaanbaatar. This session was attended by representatives from the Ministry of Nature and the Environment and the Ministry of Tourism, the State Specialized Inspection Agency, mining companies and NGOs, the Nomgon sum school dean, the head of Emgenbulag bag Khural and a herder from this area. After a presentation of the findings, the discussion focused on how to disseminate widely for maximizing benefits from the research project outputs and outcomes as well as how to make the system operational. A government official, Dr. Banzragch, head of Strategic Planning of the Ministry of Nature and the Environment, saw the system as a “small system with big future potentials”.

Recommendations for the operation of My Homeland

The viability of the system will depend on access to financial, technical and management resources. To become viable, the local NGO has to encourage all stakeholders to regularly enrich the content, promote and market the system so that it is used, raise funds to sustain the system and build capacity among staff and residents to maintain it. Mining companies are the potential business users of the system, and they should use it for information exchange and collaboration with locals as part of their social responsibility.

Recommended roles of different actors for further use and improvement of My Homeland include:

- The roles of mining companies are to:
  - share and disseminate information on mining project plans, activities and operations;
  - use the system as a tool for partnership and public relations development with local governments and communities;
  - implement and use the system for a collaboratively managed grievance mechanism; and
  - use it for establishing multilateral collaboration towards implementation of the Responsible Mining Concept (see glossary).

- The roles of nature and environmental organizations are to:
  - use the system as a tool for participatory environmental monitoring; and
  - create community-based publicly accessible environment databases and disseminate information about these.

- The roles of other organizations are to:
Recommendations for further improvements of the system include:

- keeping the *My Homeland* information system operational in Nomgon sum;
- introducing the prototype to other sums that have faced issues and conflicts around mining;
- encouraging and facilitating mining company involvement;
- developing a framework for improvement and expansion of the prototype; and
- developing a business model for sustainable operation of such a multi-agent information system.

**Lessons Learned**

The following lessons were learned from this project:

- The first necessary step is to introduce rural residents (the majority of whom are herders) to computers, the Internet and information system tools, and show them how these can be used for communication, information sharing and how their concerns or complaints can be communicated to government agencies and mining companies located in the capital city, Ulaanbaatar.
- Using simple native language is critical for communication with herders. Complicated scientific and technical terminologies confuse them and create psychological barriers. For instance, the initial title of the research project included the word “ecosystem”. We spent significant time explaining what ecosystem means and the purpose of the information system. At a meeting, after a long introduction of the system, a female herder, B. Davaakhuu, said: “So, I understand that our role is to observe and make notes on what is happening on my homeland and to make known our concerns, and then inform or visit the school to enter these notes into a computer. We can do that, as someone from our family visits the sum centre for shopping or getting petrol at least once or twice per month.” After this, we decided to title the information system, *My Homeland*. This is also the name of a well-known poem of the famous poet, Dashdorj Natsagdorj (1906-1937), who was a founder of modern Mongolian literature.
- The research fund and one-year timeframe was sufficient for research and development activities. But, implementing a stable version of such a multi-agent system in rural areas requires much more effort, capacity, resources and a longer time frame, between 3-5 years.

**Conclusions and policy recommendations**

The outputs and outcomes of the study reflect that the hypothesis, research questions, goal and objectives and the development of a multi-stakeholder relationship model and supporting multi-agent information system, were grounded in actual needs. They were also appropriate to the issues and problems associated with the use of land resources and environmental and socio-economic impacts caused by mining.

Simple information systems can be very helpful for solving complex socio-economic and/or environmental problems, if the actors are involved in its operation, contributing to their own interests, rights and duties, but with a collaborative approach, prepared to understand the positions of other stakeholders. This will lead to change people’s behaviour, from individual subjective approaches to becoming more knowledgeable, objective and transparent, embracing collaborative ways of doing and approaching issues.
The Internet access established at the secondary school for this project motivated the pupils and teachers to learn more about the technology, and reduced feelings of remoteness.

The *My Homeland* system has shown that the contents from different origins and of types, such as scientific, traditional and regulatory, can be systematized around mining and the environment issues, and be used effectively.

The research and technical team members have learned about the actual conditions and needs of rural people affected by mining. They gained experience of being grounded with real-life issues and adapted technology to benefit the various stakeholders.

This research provided both challenges and opportunities for the research team and stakeholder participants. They acquired knowledge in conducting the step-by-step and learning-by-doing exercises towards solving complex issues and preventing conflicts, with the support of information technology. *My Homeland* is the first prototype of such a system in a Mongolian rural area and demonstrates how technology can be used for communication and information sharing to facilitate a collaboratively managed grievance mechanism.

Key policy recommendations arising from the research are that appropriate government authorities:

a) support the establishment of a collaboratively managed grievance mechanism, facilitated by information technologies to protect nature and environment and mitigate conflicts;

b) are knowledgeable and active players, supporting the use of technology for solving complex cross-sectoral problems;

c) integrate existing formal systems and mechanisms for land permits, environmental impact assessment approvals and mine development evaluations with the collaboratively managed grievance mechanism; and

d) continue the operation of *My Homeland* and introduce other similar pilots to further test the operation of collaboratively managed grievance mechanisms on real life cases in order to test and prove the hypothesis presented in this chapter.
Appendix: Glossary

**Ecosystem** is a system of living organisms and their environments.

**Grievance** is a perceived or actual issue, concern, problem, or claim that an individual or community group wants a company or contractor to address and resolve (IFC & MIDA, 2008).

**Grievance mechanism**: is a locally-based, formalized way to accept, assess, and resolve community complaints concerning the performance or behaviour of a company, its contractors, or employees (IFC & MIDA, 2008).

**Information system** is an arrangement of people, data, processes, information presentation and information technology that interact to support problem-solving and decision making (Whitten, Bentley, & Dittman, 2001).

**Multi-agent** system is a system with two or more stakeholders with multiple viewpoints (Etienne, Cohen & Le Page, 2002).

**Responsible mining** is a comprehensive and transparent mining activity, respecting the rights of all stakeholders, especially of local people; environmentally friendly and free of human health impacts; embracing the best international practices and upholding rule of law whilst generating a sustainable stream of benefits for the country, where the mine is located (Asia Foundation 2007).

**Stakeholders** are those with an interest in a particular system (such as herders, mining companies and local governments in this study).

**System** applies to ecosystem, multi-agent system and information system.

References


JEMR (2010). “My Homeland” information system, DREAM IT Subproject #4: GES project, Final technical report.


This chapter reports on a study comparing interventions using online synchronous chat counselling with face-to-face services at professional counselling facilities for members of the medical profession suffering from psychological conditions, such as burnout, depression and anxiety. It outlines the study methodology, which applied cognitive behavioural therapy (CBT) for medical staff in a randomized controlled trial over a period of four months. Subject to meeting specified inclusion criteria in pre-assessments, physicians and nurses at a number of hospitals in Mongolia were assigned to either the online, face-to-face or a control group. All participants, including those in the control group, were given training at one session lasting less than one day. Participants in the two intervention groups were offered counselling during three to five sessions. The study found a reduction in all outcome indicators at the post-assessment for the three groups. While there were no significant reductions for depression and anxiety in any of the groups, the study found significant effects on personal burnout scores in the online and face-to-face intervention groups.
The project team in discussion. Photo by Burmaa Baasansuren

A working group of the project team. Photo by Datacom Co., Ltd.
Introduction

It is well established that health care professionals are at great risk of developing psychological conditions such as burnout, depression and stress, which have significant impact on their well-being (Baba, et al., 1998). Several studies have been conducted on how these conditions affect employees and the employing organizations. Work-related stress affects employee health, with 50-80% of diseases being psychosomatic or stress-related in nature (Daley & Parfitt, 1996). Burnout has also been recognized as an occupational hazard for people-oriented professions in the health care, human services and education sectors (Maslach & Goldberg, 1998). Although these conditions are different, they may share several qualitative characteristics (Iacovides, et al., 2003), and be related to the type of work performed, including responsibility, task variety, working hours, support from others and rewards (Mayou, 1987). Work-related stress among physicians can arise from heavy workloads, time “on call”, fatigue, conflicts between work and personal life, dealing with problem patients, dealing with life and death situations and financial pressures (Butterfield, 1988).

In dealing with these issues, it is very important to acknowledge the problems and to consider implementation of possible interventions. Not much research in this area has been conducted in Mongolia, but there is some evidence to support the view that health professionals are indeed at great risk. A study by the Mongolian Ministry of Health (MoH), the United Nations Development Programme (UNDP) and the School of Public Health of the Health Sciences University of Mongolia (MoH, 2010) revealed that on average, primary care physicians in Mongolia served 40-50 patients each per day and their workload was burdened by serving unregistered migrants from rural areas without receiving reward for those additional tasks. Obstetricians serve on average, 27 in-patients and 12 out-patients per day. Pediatricians spent twice as much time than other specialists per patient and this made them feel more susceptible to work-related stress, as they also served a large number of patients per day. Of all the participating health professionals covered in the MoH survey, 10.5% had sought help from professional psychologists due to their stress, caused by heavy workloads; another 28.6% had intended to seek such assistance, but could not do so.

In Mongolia, most of the interventions for burnout are mainly through face-to-face career counselling interactions and this practice typically involves the counsellor and client sharing the same physical space. However, this type of counselling seems to be insufficiently utilized by professionals with greatest need.

In other countries, a small, but growing number of counsellors conduct at least part of their practice online (Murphy & Mitchell, 1998). Online counselling services are provided in a variety of formats (Norcross et al., 2002; Stamm, 1998), with interactions between clients and psychologists taking place via videoconferencing, synchronous chat and email in place of, or in addition to face-to-face counselling. Online counselling services are frequently used and have been tested for their effectiveness in mental and behavioural therapies for those who cannot physically meet (Oravec, 2000).

Traditionally, outcome research on a new intervention is conducted by comparing the new treatment to a no-treatment control group and/or to an established intervention. Thus, the effectiveness of online counselling has been assessed by comparing the changes in client symptoms after participation in this form of intervention with changes in those not treated and/or treated through face-to-face therapies. There is some evidence that people tend to disclose more information about themselves online than in face-to-face contact (Wallace, 1999).
The purpose of the four-month trial presented in this chapter was to compare the effectiveness of online counselling in the form of synchronous chat, with face-to-face counselling, using a cognitive behavioural approach, for doctors and nurses who experienced burnout, depression and/or anxiety. Participants in the two intervention groups were offered counselling during three to five sessions. The trial was designed to explore if there were any differences in the outcomes. The trial also compared these two approaches with the outcomes among participants in a control group, who only received minimum standard care in the form of training, but no intervention.

Methodology

Theoretical background

CBT is one of the most extensively researched psychotherapy treatments. Researchers have suggested that CBT is highly effective for treating depression, generalized anxiety and panic disorders (Butler, et al., 2006). Historically, behaviour therapy was based on the theoretical framework of classic and operational conditioning. Cognitive interventions assumed a more prominent role within behavioural therapy, with increasing recognition that person-environment interactions are mediated by cognitive processes. When using CBT, psychologists work with clients to change their behaviour, thereby reducing negative thoughts and feelings (Compton, et al., 2004). It is a time-limited, present-oriented approach to psychotherapy that teaches clients the cognitive and behavioural competencies needed to function adaptively in their interpersonal and intrapersonal worlds.

CBT is a joint effort between the therapist and client who form a collaborative team to address the client’s concerns (Hiemberg, 2002). It may combine a variety of techniques, such as relaxation, cognitive restructuring, problem-solving and stress reduction (Beck & Fernandez, 1998). CBT has also been used extensively in computer-mediated counselling (CMC), such as therapy through email, synchronous chat, interactive video and homework manuals. Wright & Wright (1997) reviewed a number of computer-assisted psychotherapies and concluded that CBT was one of the most applied therapies in CMC. One reason for the suitability of applying CMC to CBT is its brief and focused nature and well-delineated, systematically implementable procedures. There are a number of computerized CBT programs and interventions (Grime, 2004).

Design and procedure

The study was a randomized controlled trial, designed to assess the efficacy of an intervention (Scott & Sensky, 2003) and aimed at assessing the potential benefits of the intervention through synchronous chat-based online counselling compared with face-to-face counselling. Participants who met the inclusion criteria and scored above 10 on the Center for Epidemiologic Studies Depression (CESD) scale (Radloff, 1977) and above 50 on the personal burnout scale (Kristensen, et al., 2005) were invited to participate in the study. At a later stage, the State-Trait Anxiety Inventory (STAI) scale (Spielberger, 1983) was added to the assessment form.

The inclusion criteria were that participants had to be doctors or nurses, suffering from at least one of the conditions studied: depression, burnout and anxiety. Exclusion criteria consisted of serious suicidal intentions, having participated in psychological therapy in the past six months, currently taking antidepressant medication and/or an inability to complete questionnaires.
Randomization took place before detailed information about the study was provided and participants allocated to a group were masked about the randomization procedure. After randomization, participants were informed only about the procedures in the group they were assigned to and informed consent forms were filled out and signed. Each participant was randomly assigned to one of three groups: synchronous chat-based online counselling, face-to-face counselling and no intervention (control group).

Data were collected on two occasions, at the start and at the end of the intervention period. The Board of Bioethics Committee of the MoH approved the study protocol.

Participants

Recruitment took place between March and May 2010, from four secondary level hospitals and five clinical hospitals in Ulaanbaatar. In Mongolia, health care is delivered at three levels: primary, secondary and tertiary. Basic health care is given at the primary care level, hospital care is given at secondary level, and specialized care is given at tertiary care level. Based on the screening questionnaire, we invited 212 potential candidates to participate in the study. Thus, medical staff, who fulfilled the inclusion criteria and scored the threshold on the scales used, entered the study. We had also sought voluntary participation (from medical staff interested, but not included in the original sample) during meetings with the hospitals involved in the baseline survey. Two participants from these meetings who showed interest in the study were included in the 212 figure, after being screened for eligibility.

After being invited to participate in the intervention, 67 people did not take up the offer for different reasons. Of these, 21 never responded and of the remaining 46, 26 immediately refused, without giving any reason. Twelve said that they were too busy, three were absent from work during the study period, the employment of two was terminated, two women were on maternity leave and one was on another assignment. Thus, overall, 145 eligible participants remained in the study (Figure 1). Forty-nine participants were assigned to the online counselling group, 48 to the face-to-face counselling group and 48 to the control group. In order to provide intra-observer reliability, the same psychologists counselled/advised in both the online and face-to-face interventions.
Baseline study (n=392)

Eligible respondents (n=212)

Randomized (n=145)

Refused participation n=26
Too busy n=12
On leave n=3
Maternity leave n=2
Employment terminated: n=2
Re-assigned n=1
Unknown reason n=21

Minimum standard care

Online intervention group n=49
Refused intervention: 11
Withdrawn by Research Team: 27
Completed intervention: 11

Face-to-face intervention group N=48
Refused intervention: 19
Withdrawn by Research Team: 19
Completed intervention: 10

Control group n=48
Refused participation: 10
Withdrawn by Research Team: 24
Completed observation period: 14

Pre-assessment

Completed according to protocol n=11

Post-assessment

Completed according to protocol n=11

Completed according to protocol n=11

Figure 1. Flowchart of participant recruitment and group assignments
For ethical reasons, we had to give something back to participants in the control group, and thus, they were included in the psychology training that was given to all participants, as a minimum standard care in this trial.

The psychology training consisted of three sessions of 45 minutes each. The participants from the three groups were mixed in the classes and were masked about their randomization status (Table 1).

<table>
<thead>
<tr>
<th></th>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>• Invited participants to discuss work-related stress and address most</td>
<td>• Assigned participants to two or three groups. Participants were asked to</td>
<td>• Together, the participants and the psychologist compiled a list of</td>
</tr>
<tr>
<td></td>
<td>prominent symptoms. (15 minutes).</td>
<td>discuss causes and symptoms of stress in their work environment. (15-25</td>
<td>effective strategies to prevent and cope with work-related stress and to</td>
</tr>
<tr>
<td></td>
<td>• Based on this discussion, psychologist gave a lecture on the fundamental</td>
<td>minutes).</td>
<td>control negative behaviour associated with stress. (15-20 minutes).</td>
</tr>
<tr>
<td></td>
<td>aspects of work-related stress and its various causes. (15 minutes).</td>
<td>• Groups discussed which solution would be useful and feasible for them-</td>
<td>• Participants received various homework assignments consisting of taking</td>
</tr>
<tr>
<td></td>
<td>• Psychologist reminded the participants that everyone had the ability to</td>
<td>selves. (20 minutes).</td>
<td>notes of their feelings and of similarities and difficulties in communi-</td>
</tr>
<tr>
<td></td>
<td>and to cope with work-related stress. Psychologist then introduced some</td>
<td>• Participants were asked to introduce and show specific strategies to</td>
<td>cation with clients and co-workers, and making a list of problems. (20</td>
</tr>
<tr>
<td></td>
<td>effective stress prevention and coping strategies. (15-20 minutes).</td>
<td>solve work-related stress problems. They also received instructions to</td>
<td>minutes).</td>
</tr>
<tr>
<td></td>
<td>Break time (15 minutes)</td>
<td>role-play example cases. (20 minutes).</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Details of psychology training

Interventions (face-to-face and online counselling)

Preparation of the intervention: portal site (www.setgel.mn)

A website was developed to facilitate Internet-mediated communication between participants and psychologists. They could access the website using any freely available web-browser, such as Netscape Navigator or Internet Explorer for the counselling procedure, which included completing questionnaires, clients chatting with psychologists and writing emails for the next sessions. The chat module was built to be platform-independent; hence, it could be read by most computer operating systems, including Unix, Windows and Macintosh. Setgel.mn was set up as a client-server system. The client side (the participants’ and psychologists’ interfaces) was provided by a set of dynamically generated web pages in which the information and functionality depended on the data available on the server side. The server side was the part of the system where all information was gathered, calculated and stored. A special administration module examined every action performed by the participants and psychologists, stored the necessary information on a relational database server, and then returned adequate feedback. The website provided security for all information sent over the network connection. To ensure security, all coding remained proprietary in nature. The system was tested intensively before the online counselling was launched.


**Intervention implementation**

The counselling sessions were conducted individually, three to five times for each participant, within a period of four months. Each session was tracked, using procedure monitoring forms prepared in advance. Online-based CBT and face-to-face counselling have mainly focused on reducing personal burnout, depression symptoms and anxiety disorders, using the eight different techniques (Vlasova, 2002) for cognitive restructuring and behaviour change shown in Table 2.

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Online counselling</th>
<th>Face-to-face counselling</th>
</tr>
</thead>
</table>
| Engagement          | • All interactions between participants and the psychologist took place through the setgel.mn website.  
• Before online counselling began, participants filled out an informed consent page on the website.  
• Participants of online counselling received counselling instructions via synchronous chat and email. In addition, the psychologist offered to read an article about online counselling posted on the setgel.mn website. (Enkhjargal, n.d.a)  
• The psychologist reminded participants of possible barriers and difficulties of synchronous chat (connection speed, computer literacy, Internet connection, etc). | • The psychologist made appointments via phone.  
• Face-to-face counselling participants received hard copies of the informed consent document before the counselling session was held at their workplace, room, office or at the psychological centre.                                                                                                                                                                                                                           |
| Focusing on the main problem | The psychologist typed several introductory questions to find and focus on the issue that each client believed was the main reason for burnout and depression via synchronous chat. Key questions were:  
• Which concern would you like to talk about first?  
• Do you agree that a solution to this problem is required?  
• Here is the link to the results of your pre-assessment. What do you think about them? | The psychologist asked several questions to find and focus on the issue which participants believed was the main reason for burnout (depression).                                                                                                                                                                                                                                                                                 |
Online Counselling of Stressed Health Professionals in Mongolia

| Working on the main problem: this helps to give the participants the ability to begin an appropriate strategy for problem-solving. | First, the psychologist typed the following: Let us talk about how to control your behaviour in certain situations. Questions such as the following followed:  
- Could you describe your feelings in certain situations? (such as when you were sad, angry and frustrated because of another person)  
- Where do these feelings come from, and what are the reasons for these feelings?  
- Could you name or categorize the reasons? | The psychologist asked about the participant’s behavioural control in certain situations and about experiencing and expressing feelings. |
| --- | --- | --- |
| Cognitive restructuring: to educate participants on the ability to reflect on their thoughts from another point of view. | Typed questions included:  
- When does a stressful or depressed mood occur and how does it appear?  
- Have you ever thought about other possible causes of your stressed or depressed moods, such as miscommunication at work or having a negative attitude towards your interpersonal communications?  
- Since you cannot show me your facial expression, can you share with me what do you think and what do you feel? | The psychologist led the interview to guide the participant to think and rethink about the real possible reason(s) that could be related to the client’s attitude or misinterpretations about interpersonal communications, through the following statement:  
- Let us talk about the possible reasons why you feel this way. Could this be due to a kind of miscommunication or having a negative attitude at work? What do you think? |
| During this step, the psychologist helps the participants find and clearly identify misleading thoughts, which can confuse real life awareness, validation and feelings. | Participants were then trained to use methods to think from other points of view. After assessing the client’s ability to realistically consider alternative perspectives, the psychologist discussed how to properly react to a situation and typed the question:  
- Can you share with me what do you think are the main reasons for your personal burnout (depression) the next time we talk? | The psychologist asked the participant if she or he has figured out the personal or behavioural reasons behind the burnout or depressed mood. |
<table>
<thead>
<tr>
<th>Training the participants to make a conscious effort to control a specific behaviour</th>
<th>In order to train participants to make a conscious effort at behaviour control, the psychologist used additional techniques, such as offering participants an e-learning course and a psychological article. The psychologist suggested that participants read the following articles which were posted on setgel.mn:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Power of positive thinking (Khandsuren, n.d.)</td>
<td>• suggesting that participants make notes of small successes on behaviour control,</td>
</tr>
<tr>
<td>• The conflict at work. (Enkhjargal, n.d.b)</td>
<td>• asking the participants to write a list of their personal and emotional advantages, communication skills, professional skills, etc.</td>
</tr>
<tr>
<td>• The reason of psychological help-seeking (Uugantsetseg, n.d.a)</td>
<td>• What is stress (Uugantsetseg, n.d.b)</td>
</tr>
</tbody>
</table>

| Homework and conditioning: In order to establish whether a client was making any progress, the psychologist assigned homework after each session and examined this work at the next session. | The psychologist requested the participant to open a new personal word file for counselling so that the clients are reminded of preparing for the next session. After every session, the psychologist required participants to document communication strategies they used with family members, co-workers and patients. Participants also documented new strategies to change negative feelings and thoughts. | The psychologist suggested opening a journal for counselling in order to remind participants what they intended to talk about and ask during the face-to-face sessions. After every session, the psychologist required clients to document communication strategies being used with family members, co-workers and patients. Participants also documented new strategies used to change negative feelings and thoughts. |
Validation and termination: This step established self-confidence in the client’s mind, reinforcing the belief that when faced with a problem, he/she would be able to resolve it without help from a psychologist.

Before the last session, the psychologist typed several questions related to whether the participant would be able to take care of himself/herself. If the psychologist judged that the client had enough knowledge. The psychologist then terminated counselling.

- Post-assessment was completed on the website.
- The psychologist reassured the participant that it was possible to get online counselling on the website again, if needed.
- The psychologist explained the post-assessment results to clients via synchronous chat, such as: would you like to see what is the difference between your pre- and post-assessment results? If so, I can send it to your email address.

Before the last session, the psychologist asked several questions related to whether the client would be able to take care of himself/herself. If the psychologist judged that the participant had enough knowledge to do this, the psychologist then terminated counselling.

- Post-assessment was completed on a printed form. The psychologist said that it was possible to get face-to-face counselling again, if needed.
- The psychologist explained the post-assessment result.

Table 2. Elements of online and face-to-face CBT for depression, personal burnout and anxiety

**Measures**

We assessed participants at the referral stage and at the end of the intervention. Assessments of outcomes were not blind to the three groups. Participants of the online counselling group were asked to fill out the assessment form via email and/or chat window. We used the following measurements in the outcome assessments:

1. Personal burnout, which is one of three main dimensions constituting burnout, was measured using the PUMA (Danish acronym for burnout, motivation and job satisfaction) study, also known as the Copenhagen Burnout Inventory (Kristensen, et al., 2005). Personal burnout contains five items of general symptoms of exhaustion. All items have five response categories. The responses are rescaled to a 0-100 metric (the values being 0-25-50-75-100). Scale scores are calculated by taking the mean of the items in that scale. The higher values indicate a higher burnout symptom load.

2. Depressive symptoms were measured by the short version of the CESD scale (Radloff, 1977). This instrument contains ten questions about the incidence of different types of depressive symptoms over a seven-day period. Answers are given on a 4-point Likert-scale, ranging from “none of the time” (0) to “most or all of the time” (3). We calculated a sum score of all items with a range of 0–30, with higher values indicating a higher symptom load.

3. Anxiety was measured by the STAI. This instrument is designed to evaluate trait anxiety and state anxiety separately (Spielberger, 1983). There are 40 questions, with 20 in each section. It is widely used in Mongolian psychological counselling practice as the main
outcome measurement. Although reliability and validity were not determined, we were confident of its face validity.

The questionnaires used for the personal burnout and depression scales are shown in the Appendix.

Statistical analysis

Statistical tests were performed on values of age, sex, profession, depressive symptoms, personal burnout and anxiety. We analyzed the data using the Statistical Package for the Social Sciences (SPSS) for Microsoft Windows. The differences between depression and personal burnout scores between pre- and post-assessments of the intervention for the three groups were calculated using analysis of variance (ANOVA). But the STAI score was missing for the control group at pre-assessment. Therefore, the score difference between the online and the face-to-face intervention group was calculated using paired as well as independent t-tests.

Results

Eleven participants who were assigned to the online intervention group immediately refused the intervention type offered to them. Of the remaining 38 participants who agreed to receive online counselling, we decided to withdraw 27, so only 11 (28.9%) participants completed the intervention according to the protocol. As for the face-to-face counselling group, 19 people refused participation and of the remaining 29 participants 19 were withdrawn from the intervention, so only 10 (20.8%) participants completed the intervention. In the control group, only 14 participants were available for post assessment (Figure 1). The participants withdrawn from interventions were considered to be dropouts of the trial because they had completed less than three sessions. The decision to consider persons who completed less than three sessions as dropouts was based on the study of Barkham, et al. (1999), who reports that persons with subsyndromal depression benefitted from at least three sessions of cognitive behavioural or psychodynamic interpersonal therapy.

The descriptive findings are shown in Table 3. The mean age of participants was 39.1 years (standard deviation (SD) 7.19) and 85% were women. Women were in the majority in each of the intervention types: 72% in the online, 90% in the face-to-face and 85% in the control group. The majority of participants were doctors (60%) and were from tertiary care level hospitals.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Online</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>Number of participants</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Age (average)</td>
<td>37.6</td>
<td>39.3</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>female</td>
<td>8</td>
<td>9</td>
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<td>Profession</td>
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<td>doctor</td>
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<td>7</td>
</tr>
<tr>
<td>nurse</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Care level</td>
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<td></td>
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<tr>
<td>tertiary hospital</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>secondary hospital</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3. Demographics of participants completing the interventions and the control group
The online counselling required more time than face-to-face counselling regardless of the psychologist. The average duration of the online counselling sessions was 77.5 minutes vs. 63.5 minutes for face-to-face counselling sessions, i.e. the online was 14.0 minutes longer (Figure 2).

Respondents reported that the advantages of the online counselling included the ability to provide the service in remote areas, decreased likelihood that participants would be defensive due to perceived anonymity, increased flexibility of services, low cost and electronic records of practitioner-participant correspondence.

Table 4 presents the scores of outcome indicators assessed at the baseline and at completion stages of the intervention. As we added the STAI questionnaire later and only in the baseline assessment forms for the two intervention groups, to assess the anxiety proneness, baseline data for these indicators were not available for the control group. All outcome indicators measured at the post-intervention stage were reduced from the pre-intervention stage. No significant differences in the level of depression or personal burnout were observed between the three groups in the baseline survey. Neither were there any noticeable differences in the outcomes related to depression between the three groups or anxiety between the two intervention groups. All outcome indicator scores decreased except that the anxiety outcome could not be measured in the control group. We found significant effects on personal burnout scores in both intervention groups in the post-assessment measurements.
Table 4. Scores on baselines and post-assessments

Table 5 shows the score differences of the outcome indicators. The reduction in personal burnout was greater in both intervention groups than in the control group. But there were no significant differences on depression between the three groups.

Table 5. Score differences of measures used

Discussion and conclusions

Online counselling services are provided in a variety of formats, including videoconference, synchronous chat and email with professional psychologists in place of or in addition to face-to-face counselling.

The study presented in this chapter examined the differences in effectiveness between synchronous chat online and face-to-face counselling, using CBT among doctors and nurses who experienced personal burnout, depression and anxiety. The results showed that online and face-to-face counselling interventions both contributed to reducing the symptoms of depression and personal burnout and also to reducing anxiety levels. Participants in both the online and face-to-face groups showed better results than the control group participants. This supports previous findings about CBT, e.g. one study showed that telephone-administered CBT reduced depression levels among patients with mild depression in eight weeks of treatment (Mohr, Hart & Marmer, 2006).
Early research in this area has indicated that online participants have typically been female (Chester & Glass, 2006). The high proportion of women in our study can be explained by the gender profile of health professionals in Mongolia.

The meta-analyses of Butler, et al. (2006), reported that CBT was highly effective in solving a broad range of psychological problems, such as depression, anxiety, panic disorders with or without social phobia, post-traumatic stress disorder and childhood depressive and anxiety symptoms. However, the scales used in those analyses were different from those of our trial.

In CBT, psychologists work with participants to change behaviour, thereby reducing negative thoughts and feelings. Our study used several CBT strategies with participants to reduce depression, burnout and anxiety, including problem identification, cognitive restructuring, supporting or enhancing coping strategies, training to improve self-consciousness, homework and diary writing (Vlasova, 2002). But many studies in the same field have used a large number of different strategies. One such CBT trial (Huibers, et al., 2004) by general practitioners for fatigue among employees consisted of two stages and used 10 different activities to assess and modify cognitions, overt behaviour and social factors associated with fatigue by explaining and setting goals for activities, providing helpful cognitions, planning systematic, gradual work and planning achievement of other personal goals.

The number of study participants was small, but poor recruitment is common in randomized controlled trials (Fairhurst & Dowrick, 1996) and low uptake is itself an important outcome when considering the effectiveness of an intervention, so reasons for non-participation were also examined.

It is important to consider the challenges of online counselling. Participants must be carefully screened and care must be taken to work only with those who will be benefit from the service. In addition, CBT online counselling is effective for populations that have good Internet access and are well-trained in computer usage (Rochlen, Zack & Speyer, 2004).

References


Development of guidelines for introducing differentiated payment systems based on labor norms, workload standard for health professionals in Mongolia. Ulaanbaatar: Sodpress Printing.


Appendix

Personal burnout scale

Five questions were asked to assess the burnout scale and respondents were asked to indicate how often they faced the conditions explored in the questions: “How often do you face the following situations. For each of the following statements, please indicate how often you felt that way.”

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How often do you feel tired?</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
<td>☐ 5</td>
</tr>
<tr>
<td>2. How often are you physically exhausted?</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
<td>☐ 5</td>
</tr>
<tr>
<td>3. How often are you emotionally exhausted?</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
<td>☐ 5</td>
</tr>
<tr>
<td>4. How often do you think:”I can’t take it anymore”?</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
<td>☐ 5</td>
</tr>
<tr>
<td>5. How often do you feel weak and susceptible to illness?</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
<td>☐ 5</td>
</tr>
</tbody>
</table>

Depression scale

In assessing the depression scale, participants were asked to indicate how often they felt or behaved in certain ways: “Below is a list of the ways you might have felt or behaved during the last week. For each of the following statements, please indicate how often you felt that way”.

<table>
<thead>
<tr>
<th></th>
<th>Rarely or none of the time (Less than one day)</th>
<th>Some or little time (1-2 days)</th>
<th>Occasionally (3-4 days)</th>
<th>Most of the time (5-7 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I was bothered by things that usually do not bother me</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>I had trouble keeping my mind on what I was doing</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>I felt depressed</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>I felt that everything I did was an effort</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>I felt hopeful about the future</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>I felt fearful</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>My sleep was restless</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>I enjoyed life/ I was happy</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>I felt lonely</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
<tr>
<td>I could not get going</td>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
<td>☐ 4</td>
</tr>
</tbody>
</table>
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This book documents a cluster of several information and communication technology for development (ICT4D) projects designed by Mongolian researchers and development workers, who set out to test solutions for critical socio-economic problems facing their country. Known as DREAM I.T., an acronym for 'Development Research to Empower All Mongolians Through Information Technology', the cluster covered the themes of governance, education and livelihoods. Each project included in the book addresses key issues in the multiple dimensions affecting and affected by Mongolia’s development from a closed, state-controlled to an open society. With its unique insights into the interaction between ICT applications and the distinctive culture and lifestyle of Mongolia, this publication demonstrates how ICTs can be creatively applied to develop the country in culturally and environmentally sensitive ways.