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How E-learning Can Improve Water, Sanitation and Hygiene Practices in Rural Cambodia

Seanghak Khin[1] and Piseth Kim[2]

1 Seanghak Khin is a Program Coordinator on Innovation and Research at Center for Sustainable Water (CSW) where she focusses on sustainable development, Integrated Water Resource Management, Water Sanitation and Hygiene (WASH), Climate Change, gender issues and smart innovative. Seanghak hold her Master degree in Water Engineering and Management in Asian Institute of Technology (AIT) in Thailand and Bachelor degree in Water Resource Engineering and infrastructure at Institute of Techology of Cambodia. Additionally, she has attended various trainings to improve her professional skills on water both national and international. She was trained in Women leadership project fund by US embassy, social business training link to Sustainable Development Goals at Philippine, and attended WASH FUTURE conference in Australia.

2 Piseth Kim is a Program Coordinator at Center for Sustainable Water and his focus is on Smart Innovations Program. He has previously worked at Engineers Without Borders Australia, WISE – WASH in Southeast Asia and OzGREEN Australia. Hismajor achievements include winning grants to successfully lead "Project Saart" on solid waste management education and "CACB Lab" on community need assessment tools for Cambodian youth. He studied Bachelor of Water Resources Engineering and Rural Infrastructure at Institute of Technology of Cambodia, and Master degree of Environmental Engineering at Institut Teknologi Bandung in Indonesia in 2015 and since then has involved actively in Cambodian WASH sector.

Abstract

Knowledge gaps between the national and subnational departments of Cambodia's government can lead to a poor implementation of policies and practices at rural level. This research project assesses the feasibility of e-learning as a new way to close those gaps, specifically using the Water, Sanitation and Hygiene (WASH) sector as a case study. National WASH guidelines were adapted into an easy-to-use and interactive e-learning course with the aim to upgrade the skills and knowledge of the Provincial Department of Rural Development (PDRD) staff. Real-world tests were carried out with staff of the Disability Action Council (DAC), the WASH District Committee and four PDRD offices. The study analyses participant feedback on the e-learning course and platform, and seeks ways to further improve and adapt it to their environment. Results indicate that it works well in Phnom Penh, where participants are equipped with up-to-date computers and good internet access, but less so in rural areas due to out of date technology and incompatible web browsers which demotivate users. Rural participants also appear to prefer using smartphones and suggest to improve the e-learning experience by making it available on mobile devices, as well as allowing to print the study material and providing better Khmer language support. Implementing these features may well lead to a successful application of digitalization and e-governance at rural level.

Introduction

The initiative to bring e-learning to the Water, Sanitation and Hygiene (WASH) sector arose out of the perceived difficulties in the knowledge transfer of strategy documents and guidelines to rural areas in Cambodia, in particular by the Ministry of Rural Development (MRD). Although many WASH strategies, guidelines and national action plans have been developed and disseminated, it is likely that the knowledge about those policy documents at provincial departments and local NGOs is still limited. According to advocacy workshops in eleven Cambodian provinces these guidelines and national action plans are still not well understood. Those who are meant to implement them use traditional approaches[3] and face a number of challenges in adopting the right approaches stated in the guidelines.[4]

An initial e-learning research project was designed to test the feasibility of using electronic methods[5] to disseminate the National Guidelines on WASH for Persons with Disability and Older People.

With the ultimate aim of closing the knowledge gaps and improving WASH practices, the study seeks to understand the behavior of the target audience at the PDRD offices and how to best adapt the e-learning platform to their environment and needs. Pilot real world tests were conducted remotely with participants from the Disability Action Council (DAC) and the WASH District Committee, whereas field tests were conducted with participants from four PDRD offices.

All participants received an invitation to start an e-learning course module by the MRD and were then prompted to undertake the learning activities by themselves. The study tracks accurate information about how many people actually took the time to start, progress through and finish the module. After a set time, all participants were interviewed.

The interviewees of the study are considered to be a valid and representative test pool for the evaluation of how e-learning can be tailored to and implemented at the subnational government level in Cambodia in the future, including both challenges and opportunities.

The results of this study are furthermore significant in informing decentralization and deconcentration efforts, which are key areas in the government's National Strategy for Rural Water Supply, Sanitation and Hygiene 2011-2025, as well as in complementing the broader efforts of bringing digital transformation and e-governance to improve the public sector of Cambodia.

Field Research Methodology

The field research was conducted by the Center for Sustainable Water (CSW) in collaboration with the Cambodian Ministry of Rural Development (MRD) and WaterAid Cambodia. The four PDRD offices chosen for the study were those of Kampong Cham, Kampong Chhnang, Kratié and Ratanakiri. The field research looks into what barriers exist to implementing e-learning, including hardware and software limitations, the strength and reliabil-

3 Thorne, Blended learning: How to integrate online and traditional learning, (London, UK, Kogan, K. 2003)

4 Padilla-Meléndez, A, Garrido-Moreno, A & Del Aguila-Obra, Factors affecting e-collaboration technology use among management students, (Computers & Education, AR 2008), vol. 51, no. 2, pp. 609-23

5 Zhang, D & Nunamaker, Powering e-learning in the new millennium: an overview of e-learning and enabling technology, (Information Systems Frontiers, JF 2003)

ity of internet access. The National Guidelines on WASH for Persons with Disability and Older People was picked as a first module. Qualitative data was collected through semi-structured phone interview with 11 participants from the above-mentioned PDRD offices, which include leadership staff such as directors, deputy directors, chief officers of rural healthcare, chief officers of rural water supply and chief officers of planning and statistics.

Field Research Results

This field research uses the Unified Theory of Acceptance and Use of Technology (UTAUT) model[6] to analyze to what degree end-users would adopt new technology. UTAUT is a framework that was created by reviewing and combining concepts and empirical similarities of eight prominent technology acceptance frameworks into one unified model. Its key constructs and moderating factors[7] were used to provide a foundation for the interview process at the PDRD offices, thus forming a basis for its questions.

Upon the field visits to the four PDRD offices, it was soon apparent that all interviewees had at least some basic access to computers and internet. As most of the interviewees held senior positions they had been given computers by the government for use in their daily work. Two interviewees who did not have computers were either waiting for it to be repaired or weren't assigned one yet. Everyone had a smartphone and it was noted, as smartphones often had been paid for personally, that these devices were in better care and more frequently updated than the government-owned computers. It was also noted that participants preferred using smartphones as a communication and work tool whenever it was possible. Conversely, computers were positioned a bit off the side of the working desk or placed in a desk drawer, whereas smartphones were always close, being charged and monitored constantly. No tablets were seen at either PDRD office.

While internet tests performed at Kampong Cham showed good speeds, the internet at Kratié and Ratanakiri soon indicated that the size and complexity of the e-learning courses would need to be limited. Interestingly, cellular internet either matched or superseded fixed line internet everywhere except for Kampong Cham. It also had better upload speeds at all three locations. All PDRD offices relied on wireless internet to some extent. These wireless routers were often located in central buildings, but also supposed to deliver internet to outlying buildings and offices at the very edge or outside their effective range. It was also noted that PDRD offices often had older CRT-monitors accompanying their stationary computers. Most high-end CRT production had ceased by around 2010 and they can now have difficulties displaying certain newer resolutions. Another potential barrier that was noted was how the local computers were not updated with all the latest software, drivers and plugins, such as the Adobe Flash video player program, both online and offline.

Cross-Cutting Themes

When introduced to the concept of e-learning, interviewees realized that it presented an opportunity to improve their field knowledge and expertise. They perceived it as something that currently seemed to be out of reach for

6 Bell, BS & Kozlowski, Adaptive guidance: enhancing self-regulation, knowledge, and performance in technology-based training', (Personnel Psychology, SWJ 20020), vol. 55

7 Brown, Using computers to deliver training: which employees learn and why, (Personnel Psychology, KG 2001), vol. 54

many people. There were previously told that limited resources at the PDRD often resulted in only few staff members being sent to workshops and conferences outside their own province. However, the interviewees understood that e-learning would help overcome this.

Development of the E-learning Course

The first objective was to develop an e-learning module to transform the "National Guidelines on WASH for Persons with Disabilities and Older People" ("the guideline") into a more easily disseminated format. The first step was to shorten and simplify the information in the guideline while reflecting the essence of the original content. There was only one major change from the original material: the overt references to 'disabled' and 'older people' throughout the guideline were perceived as overshadowing the needs of other groups. As WASH practices are considered to be universally applicable, the term 'Marginalized Groups and Individuals' was used instead.

Another requirement was to ensure that the e-learning course would be compatible with the technology at the local PDRD offices. This sometimes meant reducing the use and quality of visual aids, animations and graphical features in order to enable better performance, as they would normally need more powerful capacity. Thus, a balance had to be struck between compelling features, loading times and performance, while also making the material as accessible and usable as possible for people with hearing and/or sight impairments. The development of the e-learning course was first and foremost a collaborative process involving not only the primary researcher but also an e-learning development team, external consultants, translators, video presenters and local experts on inclusive WASH practices.

The result was an e-learning course consisting of nine chapters on different subject matters available in both Khmer and English. This was built and operated on www.aseancu.org, a platform hosting several e-learning courses by the Institute of Technology of Cambodia (ITC).

E-learning Module Real-World Testing

After developing the e-Learning module, it was thought necessary to conduct real-world testing to set up a sustainable accreditation and monitoring system, and understand potential issues with scaling up. This step analyses the potential of e-learning as a learning tool and its ability to free up time, resources and improve participants' professional development. Also the user motivation and the usability of the ITC platform and e-learning course were assessed, in order to further understand how to properly roll it out to a wider audience. Testing was conducted both remotely and on the field.

Remote Testing

Remote testing was conducted and monitored online. The e-learning module was sent out to pre-selected participants. Feedback was then collected via phone call and input into a form for later analysis. Two target groups were selected for this, one based in the capital, and the other one in the province:

- Group A consisted of six users from the **Disability Action Council (DAC)** in Phnom Penh.
- Group B consisted of five users from the **District WASH Committee Members**

(DWASH) of Kampong Chhnang province.

The remote test had low participation rates, with nearly half of the participants not opening

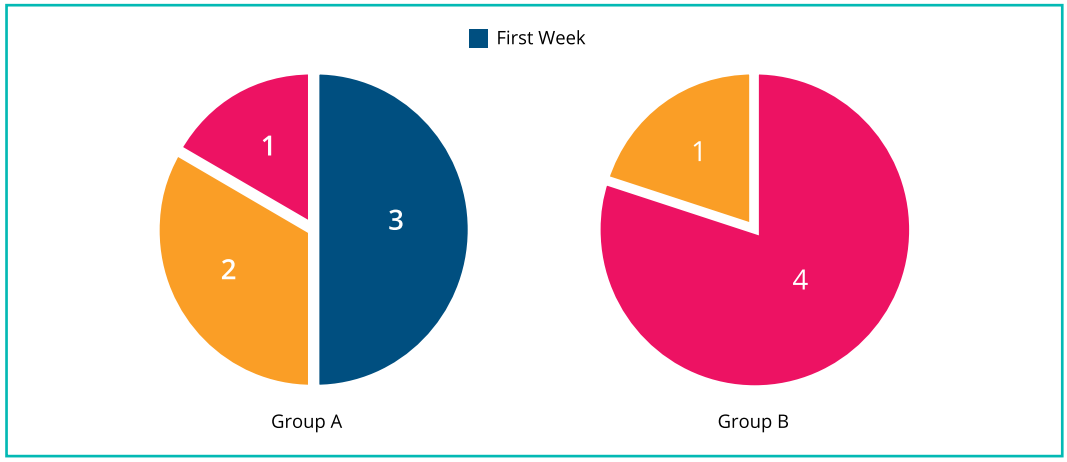

Figure 1: Result of users from remote testing of Group A and Group B

the e-learning course within the two weeks. Group A, based in Phnom Penh, had a total number of six participants of which three started the course in the first week, two in the second week and one who never logged in.

Looking at Group B, based in the Kampong Chhnang province, virtually nobody logged into the system. It is apparent that the delivery of the remote test was not well-suited to them, and despite phone calls and emails they didn't take action. Even though all participants had stated that they were both willing and had the time to participate, only one person actually accessed the material. Among other things, it was already speculated that not having the e-learning course available on mobile phone (as a mobile app or site) constituted a great barrier to their participation. To efficiently enroll Group B into an e-learning course it would seem to be necessary to alter the way the content is delivered, and to devise a system to better support them the participants through their progress.

While Group B did not finish any chapter, Group A had two separate periods of activity. Two members of Group A were both quick to enter and finish the entire e-learning course. An additional two members started their progress after the reminder date, but had not finished the course at the conclusion of the test.

Group A participants appeared to find it easier to understand how to access the e-learning course because they were familiar with and had access to computers and similar educational technologies. Given the god internet access in the capital city Phnom Penh, it is possible that Group A's participation rate and completion rate could increase even further with just a few tweaks to the e-learning system. All six participants agreed that the instructions sent out were clear and easy to understand. The two people that did not access the module encountered technical problems most likely related to the ITC platform not being accessible on all browsers and devices.

Several interviewees answered that they tried to access the material on their mobile phone despite instructions to use a computer. The remaining participants experienced no major problems during the testing period. However, they did comment that loading times of the e-learning material varied a great deal depending on the different locations they tried to access the module from. Participants actively picked locations with strong internet connectivity in order to access the module. The amount of participants in Group A who accessed the e-learning course from their home was the same as that of participants who accessed it from their workplace. Similarly, participants were split evenly between Chrome and Firefox browsers.

All participants from Group A who logged in said that they enjoyed using e-learning, found it easy to use it and felt that it could be useful in their workplace. Regardless of whether they managed to log in or not, all staff members were very positive about the potential for e-learning in their workplace. It is worthwhile to note that the subject material was particularly relevant to Group A as it is directly related to their area of work. This certainly influenced participation rates in a positive way. When asked how to best motivate future users to engage with e-learning they suggested to teach users about the benefits of e-learning and the opportunities it provides for the individual learner.

Even though only one Group B member logged into the e-learning course, the majority still felt that instructions sent out were easy to understand. When asked what best describes their reason for not starting the module, participants answers included having trouble accessing the right equipment, even though they had originally said that they have access to both a computer and internet. Most District WASH Committee Members staff don't have their own computer and depend on the office computer and internet that are too old, slow and unstable when many people access them. This technical barrier and their relatively poor familiarity with computers add up to the specific constraints of the ITC platform (the need to use the right device and the right browser). Group B participants also mentioned that they tried to access the material on their mobile phone. It may be that if the e-learning course had been available on a mobile phone there would have been a much higher participation rate. Group B had a mixed response regarding the potential for e-learning. When asked how

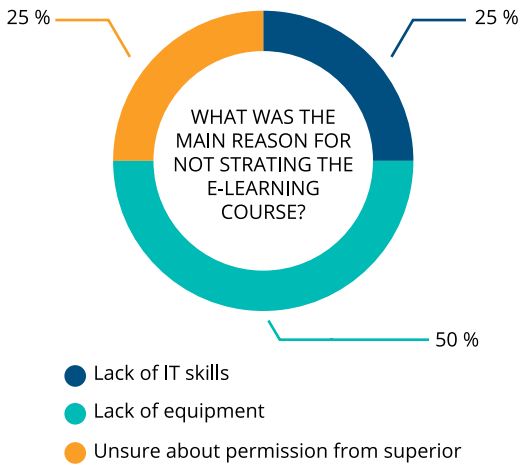

Figure 2: Reasons for not starting the e-learning course

to properly motivate people to use e-learning, most Group B participants tended to speak about creating the right support structures, having an orientation workshop, learning in groups, offering participation incentives such as a certificate and field visits for real practice.

Field Testing

Field Testing was conducted in four provincial offices of the PDRD with 24 participants - six from Kampong Chhnang, eight from Kratie, five from Kampong Cham and five from Ratanakiri. The field testing had higher participation rates, with over 85% of participants finishing the e-learning module during the two-week testing period; only one participant did not enter the test due to technical issues. Despite being helped through only the first couple of chapters, many participants finished the entire e-learning module. In the few cases where their initial response was negative, the e-learning team noticed a change in participants' perception after they had used it for the first time. When asked why they thought e-learning could be useful at the PDRD, a clear majority of participants stated that it would help improve their skills and capacity development with a minimum amount of time and resources.

The majority of participants responded positively when asked how easy it was to use the e-learning platform. However, regardless of ease of use, all participants found three barriers to participation: computer proficiency, access to the right equipment and the need to use English when accessing the platform.

E-learning appears to excite staff members at the Provincial Departments of Rural Development, and participants generally gave positive feedback after using the e-learning test platform for the first time. Together with its relatively low cost and ease of use and access, this is a good reason for rolling out e-learning as a capacity building tool.

For many participants e-learning also presented a new and easy way of sharing important material with other people. One of the requested functions was to be able to share it with anyone, without the use of login credentials.

There was no clear consensus among staff-members at the PDRD as to what accreditation method would be the most fitting. However, the most popular option was to receive a printed and signed diploma, closely followed by participants that wanted a combination of different accreditations. Answers given in interviews indicate that the format of the diploma would be important, especially who and/or what organization it was issued by. The majority of participants wanted the diploma to be signed by the MRD, and around a third mentioned that it should also be co-signed by the implementing NGO.

When asked about what could be improved on the platform, respondents wish for automatic progression between chapters, easier navigation within chapters in order to revisit knowledge from earlier sections and also improved loading times before and between chapters.

In terms of accessibility, participants stated that they wish to use the e-learning course on their smartphones, and some also want the course videos to be available as text, and for the course guidelines to be available in Khmer language.

In terms of being able to share the material, there was strong feedback on creating the ability to print material from the e-learning course. Able to print study material Course include video.

None of these suggestions are hard to implement, although the feature to print material

from the e-learning course has to be carefully considered, as printouts may not always reflect updates to the study materials.

At present, most of the critical feedback is related to functionality issues. The platform itself is getting older and doesn't offer an up-to-date mobile experience. It doesn't work very well on all newer browsers - a clean install of Firefox without any add-ons will block the e-learning content window as the browser believes it to be potential spam. It is almost impossible to use the ITC

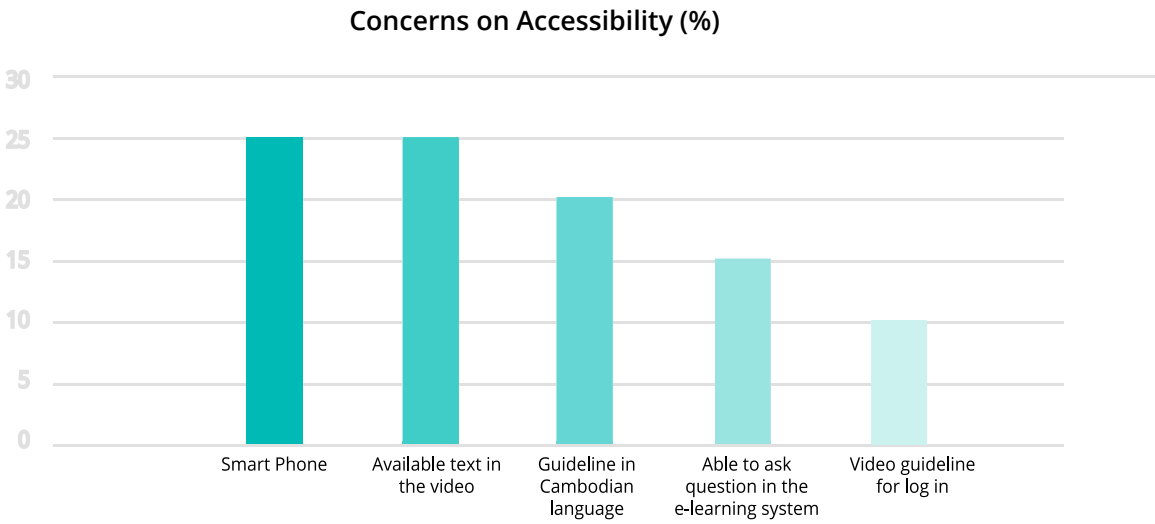

Figure 3: Percentage of participants and concerns on accessibility

e-learning platform on the Safari browser, which will make it extremely difficult to reach anyone with a Mac. First off the "dock" at the lower end of a mac screen blocks navigational buttons used to progress through the e-learning content. New content blocking features introduced ear-

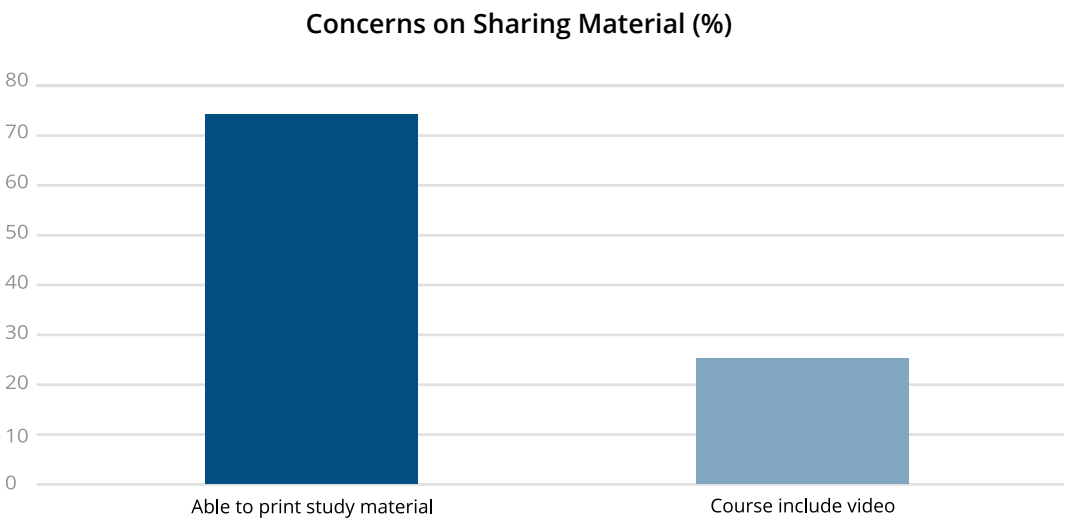

Figure 4: Percentage of participants and concerns on Sharing Materials

lier this year by Apple also impacts all media throughout the e-learning course. This means that video often does not play and that music and audio cues are missing.

For the majority of staff at the PDRD offices who are not very experienced with computers these issues may look like the platform is simply not working.

Conclusion and Recommendation

E-learning appears to have strong support among those who work at rural departments in Cambodia as they seem to understand the benefits it can offer in terms of capacity development and professional skills training. It allows workers to access information and provides interactive learning with on-demand availability, self-pacing and personalized instruction. However, the motivation shown by participants is not satisfying, likely due to limited internet access and technology in the rural area, the most commented drawbacks during the testing. Real-world testing has provided a roadmap for improving the delivery of the e-learning course.

There still are some challenges to navigate, such as the need to build a new, more advanced, e-learning platform that will directly impact the experience of its target users, for example through mobile functionality, and to formalize cooperation with the Cambodian government (with the Ministry of Rural Development, in this particular case).

As a follow-up initiative, the Center for Sustainable Water has recently also started developing a new e-learning platform using "WordPress", a popular template-based system to create websites. This is combined with plugins like "Articulate" to set up e-learning modules and "Dash" to deliver quizzes, award certificates, manage users and reports.

Given the potential value e-learning can bring to the public sector workplace it will benefit stakeholders on both sides. Aside from empowering workers, it would invariably reduce costs for the governmental department, improve tracking and monitoring, as well as streamline the delivery and standardization of content, which would serve as a successful example of e-governance at rural level.