

TRAINING MENTORS OF HEALTH INFORMATION SYSTEMS THROUGH eLEARNING

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Abstract: The district health information system (DHIS) is currently used in more than 40 developing countries. The project aims in finding effective training methods to improve user's learning outcomes and in grooming mentors that can attract new users. Based on literature recommendations and a user survey, an eLearning course through an in-app in the software is under development to be used in low connectivity areas. The eLearning course will emphasize interactivity, motivation, practice exercises and feedback. In addition to the normal user level, this course also has a mentor level to be taken by some users in each site where the system is used, such that the mentors can guide new users locally.

Keywords: Health Information System, Low Income Countries, Superusers, eLearning.

1. INTRODUCTION

The introduction of ICT in developing countries has been marred by “pilotitis.” A seemingly endless stream of ICT interventions die out after the donor has left due to poor institutionalization. There are several reasons why ICT systems are unsustainable, and this research addresses low user competence, which is, particularly in rural areas, one system killer (Kimaro & Titlestad, 2008). Training in basic ICT plus system specific skills followed up by regular support visits were found necessary for a health information system innovation to succeed (Ngoma, Kaasbøll, & Aanestad, 2008). The need for local support has been addressed through training some users more than others, such that they become mentors who are able to support, guide and encourage other staff on using an ICT system (Coulson, Shayo, Olfman, & Rohm, 2003; McNeive, 2009). While acknowledged as a viable strategy towards sustainability of the systems, the approach so far has been to just provide more training for those selected to become mentors. This is an expensive method when scattered trainees need to join up for several days in a central city. The research in progress reported here aims at developing efficient methods for training mentors in rural settings in low and middle-income countries, thus contributing to sustainable information systems.

Reaching out to potential mentors in rural districts can be achieved through a distant learning approach supported by an eLearning course. Based on review papers, we establish nine conditions that such training should meet. Distance training by means of ICT has in general had modest success (Hattie, 2009), and intermittent electricity supply and unpaid internet subscriptions which are often the case in the relevant setting make eLearning more challenging. However, studies suggest that the following functionality will enhance learning (Cook et al., 2010);

1. Feedback
2. Practice exercises
3. Repetition
4. Online discussions

5. Audio

Many conditions are required for people to use at work what they have learnt in courses (Grossman & Salas, 2011). Some of these can be affected during training:

6. Motivation. Learners find the training useful and are motivated to learn and apply new competence at work,
7. Self-efficacy. Can be improved through watching a peer believed to have similar abilities as yourself, solving a problem.
8. Realistic training environment with close resemblance between the subjects taught and work tasks. This implies the same software being used for training and work.
9. Learning anticipating and handling problems.

Based on these factors, the project will develop an eLearning course implemented as an app extension to the web enabled routine District Health Information System (DHIS, 2014), which can work in locations with poor connectivity. Such an approach can reduce training costs, thus contributing to a sustainable training approach for learning of information systems.

The research questions are

1. What is the necessary training and support to make people who are neither managers nor computer scientists able to champion and support a health management information system at their workplace?
2. How can eLearning courses be designed to improve user competence in areas with poor connectivity?
3. What is the outcome of eLearning courses compared to face-to-face training?

2. SETTING

This project builds on achievements made in health information systems research (Braa & Sahay, 2012), particularly the implementation of the DHIS in more than 40 countries.

The setting for this research will be the health management information system of Malawi, where the integrated DHIS has been implemented. Malawi has 29 district health offices where data is entered from paper forms to the web system. In each district office, there are 20 or more health programme coordinators, one Health Management Information Systems (HMIS) officer who has HMIS with the DHIS system as their prime task, and a few clerks who help out on data entry and other system related tasks. The total of 600 programme coordinators at district level need to learn the DHIS for analysing their monthly data collected from facilities on paper and entered into the database in the district offices. The coordinators in districts are often transferred, such that new ones have not taken part in any DHIS training. HMIS officers and clerks are more stable, such that the training will target these groups.

The DHIS is run through a web browser and stores data in a national server. Due to the number of data concepts (organisation unit, data element, period, data set, validation rule, indicator, graph, ...) there is no easy fix to make it look simple at the user interface. Therefore, considerable learning efforts are required to be able to use it efficiently.

3. METHOD

The research is carried out in three stages.

1. Survey of mentor competence. A questionnaire was sent to the global DHIS user e-mail list asking about their opinions of what a mentor should be able to do. The list had 716 members in six continents, most living in LMIC. Fifty useful responses were received,

which is a 7% response rate. Wilcoxon's signed-rank test was used for testing differences between high and low Likert scale responses, since no normal distribution was assumed.

2. Development of Apps & Learning material – iterated. Each iteration will consist of a design and an evaluation phase. The purpose of the evaluations will be to find as many issues in the learning material as possible, thus variation amongst the test subjects is valuable, while representativeness is of little concern. The data from the observations and interviews will be analysed qualitatively, aiming at finding reasons for learning and non-learning in the learning material. This project is currently in the design phase of its first iteration.
3. DHIS aims at providing indicators to health management. To measure the effect of the training, the final evaluation will assess the average number of reports generated from the system per health manager. This number is found in system logs. Around 20 health managers work in each of the 29 district offices. eLearning will be carried out in ten offices, while no intervention will be carried out in a control group of ten other offices. To gauge the effect of the eLearning over time, the average number of reports will be measured monthly from month 4 to 9 after training commenced and at the same period in the control group. Assuming that face-to-face training is more effective than eLearning, face-to-face training will be carried out in the remaining nine districts, and the same evaluation will be carried out there. The evaluation will thus provide a measurement of the effectiveness of the eLearning vs. no training and vs. face-to-face.

4. SURVEY RESULTS

Table 1 lists the rank and mean scores of responses to the question on what mentors should be able to do. On the 1-6 scale, all mean scores are above the middle choice of 3.5, implying that mentors should be able to do everything. However a couple of findings seem relevant when designing mentor training.

Rank	Ability	Mean score
1	encourage other users to use the system	5.4
2	guide other users such that they become able to solve other problems themselves	5.3
3	guide other users such that they become able to solve the particular problem themselves if the problem reappears in the future	5.2
4	communicate with IT people	5.2
5	achieve trust from others	5.2
6	learn new IT solutions, changes, and updates	5.2
7	solve IT related problems	5.1
8	argue convincingly for the purpose of the system towards other users	5.1
9	achieve social ties with others	5.0
10	observe misfits between IT and business	4.7
11	carry out IT related tasks which other users don't want to do	4.6

Table 1. To which extent should a mentor be able to ... (Shaded area: significantly lower scores than Rank 1)

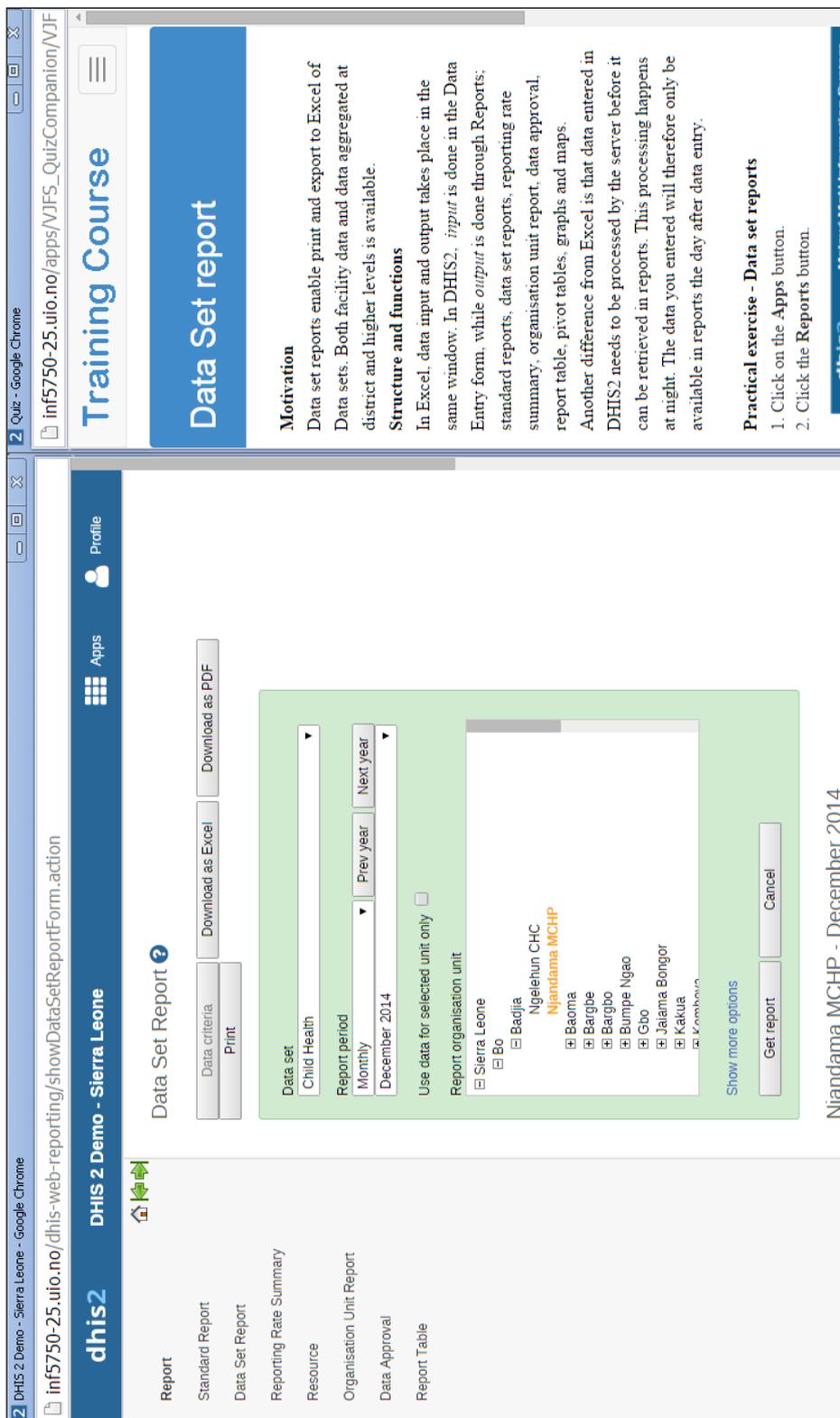
Mentors' abilities to get others to use a system are ranked highest amongst the scores. It would be likely that "argue convincingly for the purpose of the system towards other users" would have had a similar score. However, this alternative is marginally significantly below the rank 1 score. One reason may be that the ability to encourage is deemed more important than the ability to argue. This may imply that mentor training should aim at developing their capacity for encouraging others, which is in line with previous studies (McNeive, 2009; Poe, Abbott, & Pronovost, 2011).

The ability to learn solving problem yourself came out as rank 2 and 3 in the question. Based on other questions, the results were split into respondents being help givers versus receivers. The

outcome was that those who mainly *receive* help think that mentors should be able to guide other users both such that they become able to solve the particular problem and other problems themselves to a significantly higher degree than those who mainly *provide* help. Hence the less skilled want to learn to be able to solve problems themselves, while the more advanced do not seem to acknowledge that the less skilled want this.

5. APPS

The DHIS2 can be extended by apps, which are also running on the users' computer. Having in-app training as part of the software to be learnt meets condition 8. It will show up in a separate



browser window with no overlap with the application see illustration above.

The DHIS operates in areas with poor internet connectivity through minimised data transfer and offline mode when the network is down, and the training apps will follow suit, again fulfilling condition 8. Functionality for sharing experiences during course taking may also be implemented in a mobile phone app, meeting condition 4.

The course evaluation app will be able to log the activities of a chosen group of users for specified time periods. The output will be anonymised in order to avoid ethical issues on surveillance of health workers.

6. LEARNING MATERIAL

The user learning material will consist of one module per topic. For each topic, there will also be a mentor module aimed at bringing the users to the level where they can support others.

A user course will consist of 3-5 modules like this:

1. Presentation (2 pages, possibly a few seconds of video (5)).
 - a. Motivation for the usefulness. (Condition 6)
 - b. Structure & function. Presentation for understanding in order to be able to solve problems and guide others (9).
 - c. Practical exercise. Sequence of steps for doing the operations for learning the skill (2).
2. Assignment. One or more of
 - System log showing that the Learner has accomplished the task on the system, requiring that the task is repeated during three days (3)
 - Quiz with feedback on the answers (1).
 - Approval from a more experienced colleague. (1)

For completion of a course, the learner also has to contribute to an online learning community, meeting Condition 4. After completion, the user will receive a certificate from the Ministry of Health and the UiO, confirming management recognition.

After completion of a user course, the learner will be allowed to start up the mentor course on the same topics. The mentee will be a colleague, possibly with higher status than the mentor (Condition 7 for the mentee). A module:

1. Presentation (2 pages with links to User Manual and other documentation, possibly video).
 - a. Prerequisites for the mentor to prepare.
 - b. Guidelines of how to supervise the mentee during the corresponding tasks in the User course (2).
 - c. Issues, which people have when learning this topic (9), also preparing for problem solving as was suggested in the survey.
2. Assignment. One or more of
 - System log showing that the Mentee has repeatedly accomplished the task on the system (3).
 - Quiz (1).
 - Approval from the mentee (1).

- Write issues that arise during mentoring in online mentor community.

5. Data Set report

Motivation
Data set reports enable print and export to Excel of Data sets. Both facility data and data aggregated at district and higher levels is available.

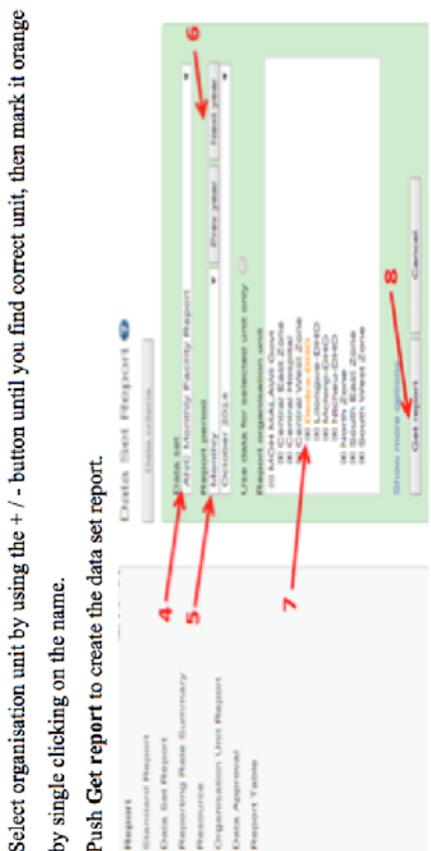
Structure and functions
In Excel, data input and output takes place in the same window. In DHIS2, *input* is done in the Data Entry form, while *output* is done through Reports; standard reports, data set reports, reporting rate summary, organisation unit report, data approval, report table, pivot tables, graphs and maps.

Another difference from Excel is that data entered in DHIS2 needs to be processed by the server before it can be retrieved in reports. This processing happens at night. The data you entered will therefore only be available in reports the day after data entry.

Practical exercise - Data set reports

1. Click on the **Apps** button.
2. Click the **Reports** button.

7. Select organisation unit by using the + / - button until you find correct unit, then mark it orange by single clicking on the name.
8. Push **Get report** to create the data set report.



9: You can download your report as an Excel sheet, PDF-file or print by a single click on these buttons.



Assignment

1. What is the difference between data input and output in DHIS2?
 - a. Output is typing the numbers in the Data entry form.
 - b. Output is retrieved from reports, while input is through Data entry.
 - c. Input is done through Data entry, and output consists of exporting Data entry to Excel
2. What is a data set report?
 - a. The same as the data entry form.
 - b. Facility data and aggregated data at district and higher levels.
 - c. Facility data and patient data at district and higher levels.
3. How do you choose report period?
 - a. Click on get report
 - b. Choose year and then frequency.
 - c. Choose frequency and then year

3. Click on the **Data Set Report** button to enter the data set reports.
4. Choose relevant data set.
5. Choose relevant frequency of period.
6. Select wanted year. If one chooses monthly above, select wanted month.




Mentor 5. Data set report

Prerequisites

Before you start mentoring a user on Data set reports, you need to find data entered yesterday or before. Before the mentee saves the Data set report on their local computer, make sure the mentee saves it on a place where they easily can access it later. An example of this can be to create their own folder where they can save reports.

Added value for the mentee and the health management

As a mentor one will create a larger understanding for how to fetch aggregated data through the data set reports. You'll also help other to fetch this information.

Guidelines

1. Encourage the mentee to use this report for checking data input.
2. Make the mentee go to Data set reports and find data from the day before or older. Make him/her create a Data set report.
3. Make the mentee export the report to an excel sheet. Guide the mentee on where the file should be saved.
4. Make the mentee find data that has been entered the same day. Ask about why the data is not shown.

Common errors

Fetching a data set report straight after entering data; it takes 24 hours before one can fetch the data set report after entering data.

Assignment

Send or answer a message to the mentor group on some reflections of what you have learned about Data set report.

Creating a community of mentors helps improving their practice (Wenger, 1998), which has also been found beneficial also for more advanced training of DHIS implementers (Siribaddana, 2014).

7. CONCLUSION

Based on literature, the research question on how to design eLearning courses to improve user competence in areas with poor connectivity should fulfil nine conditions. A survey in the user group indicated that encouraging others should be top priority for those mentoring others, and that mentees wanted to learn how to solve problems. A user course plus a mentor course were designed according to these conditions as an in-app that is part of the software DHIS. The mentor course aims at developing local personnel to become IT mentors for colleagues, and such

courses have not been found in the literature. The same strategy can be used for all distributed business systems.

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