

Translating an on-site course to an online course for implementers of an open source software system

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of an open source software system.

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Abstract

Background

The DHIS 2 Academy program provides onsite courses where they train DHIS2 implementers, users and administrators in different locations of the world several times a year. There is a rapid growth for more academies to be held. However there are certain limitations and barriers related to a further outreach of these courses such as logistical work, financial issues and less quality assurance of the training of the users if the size of the group expands. In order to solve these limitations the primary goal is to introduce an online course as a new training offer.

Objective

The research objective of this study is to translate and convert learning material for an open source software system, DHIS2, into an online format in a selected Learning Management System(LMS).

Methodology

The study uses an Interpretive Action Research cycle to investigate the research objectives of the thesis. The research methods for the empirical findings consist of data gathered through interviews, questionnaire, usability test method; *thinking aloud* and document reviews.

Results

The results consist of translated learning material and a prototype of an online course designed in a learning platform, Open edX. Two evaluations were conducted, namely the screencasts and usability test of selected learning modules. Flowcharts, screencasts and videos were the preferred means of learning in the online course.

Conclusion

Based on the experience of working with the Action Research cycle as a framework, the evaluation cycles were found to be most important during the shaping of the course. Further research is needed in order to measure other key factors for a successful online course design. There is also a need to measure the learning outcomes based on the translated learning material along with the user interface(UI) and user experience(UX) of the finalized learning environment.

Preface

My gratitude goes first and foremost to my supervisors, Jens Johan Kaasbøll, Matthieu Pinard and Ellen Fruijtier for guiding me through the practical and theoretical parts of this study.

An extended thanks goes to the trainers and participants on the onsite DHIS2 Academy as well as the test participants who were able to make the time for the usability test.

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*Hodo Elmi Aden
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Abbreviations

AR Action Research

DHIS Distributed Health Information Systems

HISP Health Information Systems Programme

MOOC Massive Open Online Course

LMS Learning Management System

CMS Content Management System

LTI Learning Technology Integration

1 Introduction

There has been a growth of online education the past years, with an increase of people that are taking courses online. Our modern society is now more globally connected than ever before.

Nowadays people are more online and there is an increase in sharing much more information with each other than before. Especially in terms of the usage of social media and other network-based technologies both in and outside of work. Nowadays there is also an easier access to online education and vastly improved learning technologies to conduct and assess education and training.

The DHIS 2 Academy is a training program offered by HISP UIO. The thesis is part of an on-going project by HISP UiO(Health Information Systems Program, University of Oslo) set within the GI(Global Infrastructure) research group at the Department of Informatics, University of Oslo.

The DHIS 2 Academy is run between 8 and 12 times annually in five sub regions (Western and Central Africa, Eastern Africa, Southern Africa, Asia and Latin America) around the world.

The program provides onsite courses where they train DHIS2 implementers, users and administrators.

There is a rapid growth for more academies to be held. In a strategic document published by HISP UIO¹, they explain that the DHIS 2 Academy project will be further developed and aimed at rooting it within a network and local partner institutions which will be essential for its long term sustainability.

HISP UIO further explain that due to a rapid growth of requests for more Academies and training workshops, the DHIS 2 Academy program will scale up to include and implement an online component.

1.1 Research Context and Motivation

It is an underlying wish by HISP UIO and the DHIS2 Academy to continuously improve their tools and teaching materials. It has been explained through interviews with trainers and coordinators that the academy can only accommodate between 40 and up to 80 participants. If this size group

¹<https://www.mn.uio.no/ifi/english/research/networks/hisp/hisp-lio-strategy-13.03.2014-2014-2016.pdf> [Last Retrieved: 23.11.2015]

expands significantly, it becomes more practically difficult and costly. And this in turn will lead to less quality assurance of the training of users.

Further on, the academies require a certain amount of logistical work, both in terms of scheduling venues and accommodating the participants and trainers during the on-site Academy.

These limitations push HISP UiO to think of other ways to reach more participants and scale the DHIS2 Academy. In the traditional on-site Academies, the participants mainly come from the central level.

This means that there is an untapped user group (end users) who also needs to be trained and have a need to acquire necessary and relevant skill sets for their work areas.

In order to target these user groups and reach more participants, the DHIS 2 Academy will therefore introduce an *Online DHIS2 Academy*.

Thus the DHIS2 Academy aims to build a virtual community of DHIS 2 users. More specifically the plan is to introduce online courses in their portfolio of training methods and programs.

The research method that has been applied throughout the study is AR (Action Research).

The study revolves around implementing and taking a learning management system (LMS) in use, in order to create an online course.

1.2 Research Objectives

The research study is about the implementation of an e-learning strategy in the form of an online course. The aim is to translate an onsite course into an online course. It is also to explore a new and promising trend within e-learning called *MOOC* (Massive Open Online Course), and the underlying goal is to design the online course in this format.

The overall issue I want to study is how to create an online course which is proposed as a new training offer in the DHIS 2 Academy.

I will also explore the digital learning tools and the process of transferring of learning material online. The research approach chosen for this study is Action Research (AR) which I will elaborate on in chapter 4.

During the study I will focus on the following research objectives:

- **Translate learning material from the on-site course.**
- **Identify the guidelines for the design process of the online course.**
- **Evaluate the translated learning material.**

Research question

- **Which aspects are important in an online course for implementers of an open source software system?**

1.3 Structure of the Thesis

Chapter 2- Theoretical Framework presents the literature that is used as a theoretical background. This chapter covers the following sections: E-learning, Online Learning and LMS.

Chapter 3- Background presents the backgrounds of HISP UIO, the DHIS2 software and the DHIS2 Academies.

Chapter 4-Methodology provides the background on the chosen methodology, AR and the methods that were used for the data collection process.

Chapter 5-Diagnosing presents the data analysis that was conducted during the data collection process as well as a diagnosis of the obtained data.

Chapter 6-Action Planning presents an overview of learning platforms that are reviewed based on document reviews and a detailed overview of the selected learning platform, Open edX.

Chapter 7-Action Taking describes the elements behind the prototype of the online course in the LMS.

Chapter 8-Evaluation presents two evaluation cycles of the translated material and the results and reflections on this phase.

Chapter 9- Discussion and Specifying Learning provides a discussion on the findings behind the AR cycle and reflections on the chosen research approach.

Chapter 10- Conclusion and future research provides a conclusion on the defined research question and present some suggestions for future research areas with the online course.

2 Theoretical Framework

2.1 E-learning

In this chapter, there will be a review of literature and theory related to this thesis.

I will start by defining *e-learning* and look at literature on the history of e-learning. I will then introduce an application called *online learning* within this term, thus narrowing my focus to online learning in this study.

In the following section, there will therefore be an elaboration on one type of tools and techniques one might find within e-learning, a learning management system (LMS).

In a later section I will introduce the architecture and features behind the chosen LMS. In relation to this I will provide an introduction to the tool and briefly discuss the recommended guidelines and requirements for an LMS.

Shown below is a model I've created to illustrate some general aspects of what E-learning may consist of. There are several more elements that exist to E-learning than what this model portrays; however I've narrowed it down to these because of the research scope within this thesis.

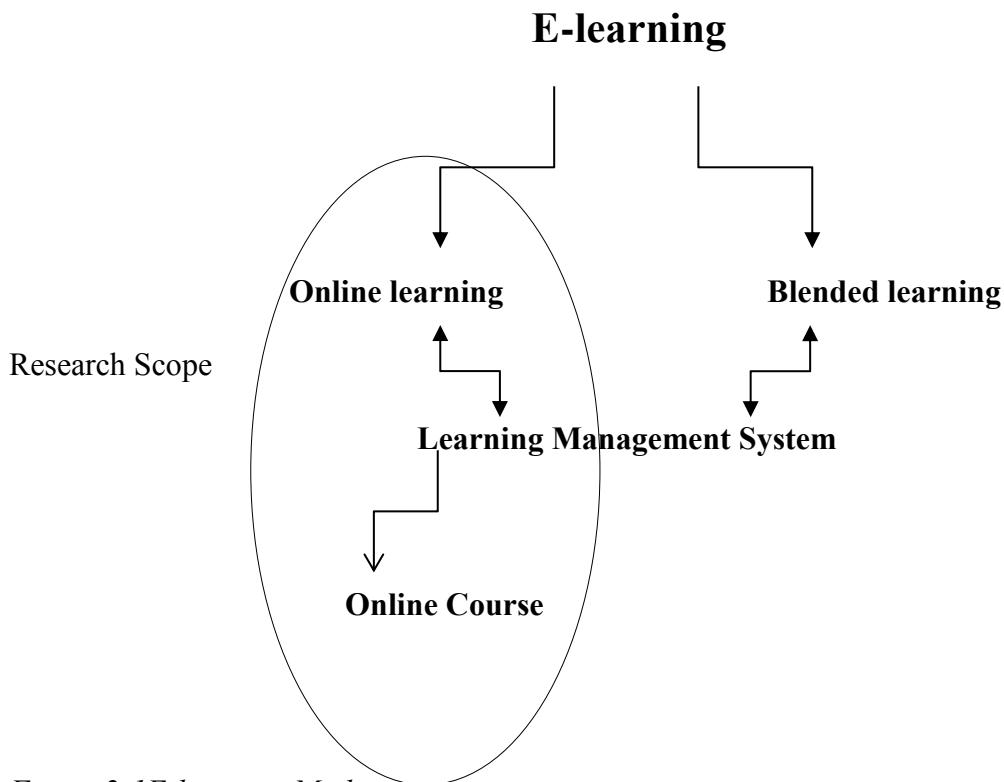


Figure 2-1E-learning Mode

2.1.1 Definition

In this section I will explain the various definitions that are associated with the term E-learning.

The different definitions and views of what e-learning are important to show because they reveal the vastness of e-learning. They reveal different perspectives of the term.

At the end of this section a customized table which summarizes the most relevant various definitions for this thesis is presented.

Generally E-learning is understood as something that transmits education through a technological component, in example teaching with technology.

There are various definitions of E-learning; some are more focused on the technical aspects of E-learning whilst others are more focused on educational learning aspects of it.

(Sangrà, et al, 2012) identified four general categories which they derived from various literature reviews on different definitions of e-learning. The categories were identified as: 1) technology-driven, 2) delivery-system-oriented, 3) communication-oriented, and 4) educational-paradigm-oriented. They provide a number of definitions under these categories,

In the table below I've gathered the various definitions of e-learning presented earlier by organizing them within the four general categories by (Sangrà, et.al, 2012). There is also an inclusion of their previously categorized definitions.

The 4 general categories By (Sangrà, et.al, 2012)	Authors	Example of definitions
Technology-driven	(Piccoli et.al, 2001) (Governors State University, 2008)	A web-based system that makes information or knowledge available to users or learners and disregards time restrictions or geographic limitations. E-learning is to take a course online using a modem, wireless, or cable connection to access academic course material from a computer, phone, or handheld device.
Delivery-system-oriented	(Rice and Mckendree, 2014) (Lee and Lee, 2006)	A framework or infrastructure into which materials are placed and in which activities take place. E-learning is an online education defined as the self-paced or real-time delivery of training and education over the internet to an end-user device.
Communication -Oriented	(Garrison and Anderson, 2003) (Hrastinski,2008) (ibid)	E-learning is formally defined as electronically mediated asynchronous and synchronous communication for the purpose of constructing and confirming knowledge. Asynchronous e-learning is defined as the type of learning which makes it possible to log on to an e-learning environment at any time, and download documents or send messages to teachers or peers. Synchronous e-learning is defined as learning that occurs at the same time, but not in the same place, for example through chat and live webinars.
Educational-paradigm-oriented	(Ellis, et al, 2009)	E-learning is defined as information and communication technologies used to support students to improve their learning.

Table 2.1 Categorized summary of e-learning definitions

Hrastinski, (2008) define two types of e-learning, synchronous and asynchronous.

He explains asynchronous learning as the type of learning which makes it possible for learners to log on to an e-learning environment at any time and download documents or send messages to teachers or peers. Whilst synchronous e-learning is defined as learning that occur at the same time, but not in the same place, for example through chat and live webinars.

In this thesis I will focus on asynchronous learning.

Shown below is an e-learning definition which will serve as a reference throughout the thesis. This definition falls into the delivery-system-oriented category.

“E-learning is an online education defined as time-framed delivery of training and education over the internet to an end-user device” (Revised after Lee and Lee, 2006).

2.1.2 Guidelines for e-learning in an organization

In this section there will be presented an overview on recommended guidelines and considerations in the process of implementing e-learning as a strategy in an organization.

(Wild et.al, 2002) provides a framework for employing e-learning as a tool for knowledge management that addresses important planning and implementation consideration that will help ensure the success of organizations' e-learning initiatives.

They propose 4 phases in their framework: organizational readiness, designing the appropriate content for e-learning, designing the appropriate presentation for e-learning and the implementation considerations.

Next they propose a learning map which can help to direct the e-learning process and assess its success. They also list several considerations in relation to implementing e-learning in an organization. Naturally, the first one is to identify the learning goals and objectives for the learners. These should also be linked to the organizations goals for knowledge acquisition. (Wild, et al, 2002) Next is to create a structure for the course, digitize their information material and adapt the

information into notations that can be placed online.

They further explain that feedback loops needs to be provided along with an analysis of the course content and structure for effectiveness. Implementing e-learning within an organization normally requires an economic investment and a technical infrastructure. However if the organization identifies that there could be a potential return of investment in terms of a stronger and more effective knowledge management, it could be a strong move for the organization.

2.1.3 Designing successful e-learning

In this section the various factors behind a successful e-learning design will be presented and discussed. When it comes to designing e-learning environments, the design challenge for E-learning is two-folded. This is because of the design principles for both the pedagogical element and the technological element.

Sun et.al. (2008) presents a study which seeks to identify critical factors ensuring a successful e-learning design and operation from a holistic viewpoint and present guidelines for e-learning management. They tie this to the importance of the users' experience and satisfaction.

Sun et.al. (2008) further explains that in an E-learning environment, several critical factors account for users' satisfaction. These are defined as:

- perceived usefulness and ease of use,
- diversity in assessment,
- instructor's attitudes in handling learning activities,
- course flexibility,
- course quality

They categorize these factors into six dimensions: student, teacher, course, technology, system design and environmental dimension, see figure 2.2.

The difference between the technology, system design and environment design, is explained as the functional technical requirements in the technology and non-technical requirements such as the user experience and user satisfaction.

The results of their study showed that 'course quality' is the most important concern in an e-learning environment. They conducted a stepwise multiple regression analysis where they used *course quality* amongst the previously mentioned factors as an independent variable.

By course quality the authors referred to overall course design, teaching materials and interactive discussion arrangements. In addition they also conclude that technological design plays an important role in students' perceived usefulness and ease of use of a course. These design elements will have an impact on students' satisfaction. Another factor which was found to play an important role in e-learning satisfaction was flexibility. One of the many advantages of online education is its flexibility in which learners choose the most suitable learning methods to accommodate their needs. (Sun et al., 2008, p 1196)

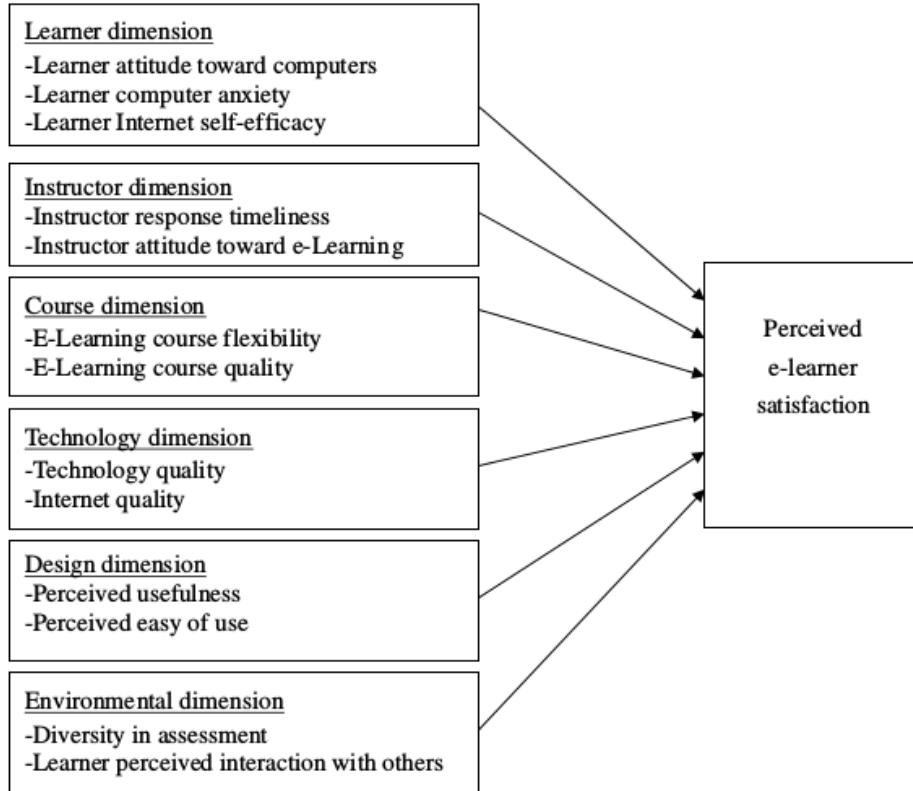


Figure 2-2 Dimensions and antecedents of perceived e-Learner satisfaction

Shown below is a figure by (Holsapple and Lee-Post, 2006) that depicts an e-learning success model. They adapted this model from an information systems success model made by (Delone and McLean, 2003).

Delone and Mclean, (2003) identified six dimensions of success factors: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. See figure 2.3.

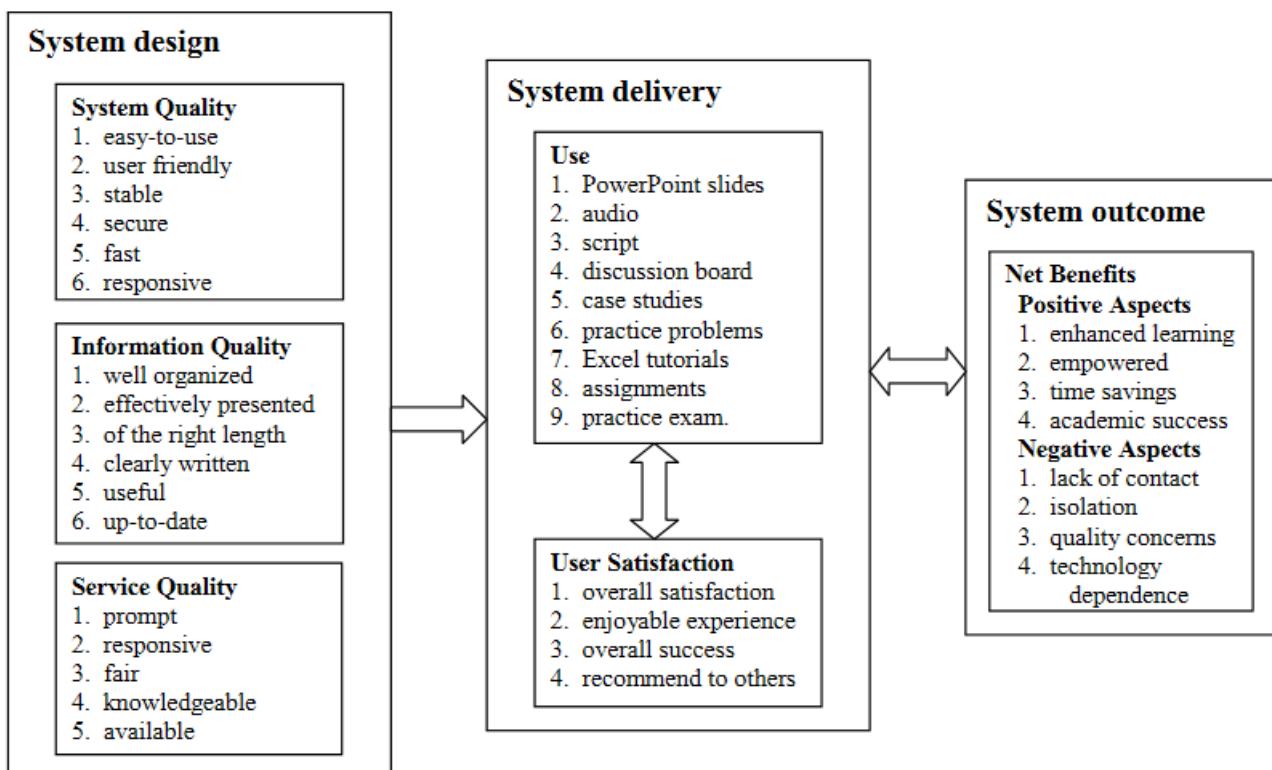


Figure 2-3 The E-learning Success Model and sample metrics based on Delone and McLean's (2003) model.

They explain that the model illustrates the success of the delivery stage, and this is evaluated along two success factor dimensions: use and user satisfaction.

Further on, the overall success of E-learning initiatives depends on the attainment of success at each of the three stages of E-learning systems development: design, delivery, and outcome analysis. The arrows in the figure show the interdependences within the three stages of success assessment.

(Holsapple and Lee-Post, 2006)

2.2 Online Learning

There is a wide selection of different types of applications and tools for applying e-learning.

In the previous sub-chapters I discussed e-learning as a general topic and LMS as the technological component that applies e-learning. In this sub-chapter and throughout the rest of the study, I will narrow the focus down and keep referring to online learning.

I will also present and explain a tool which is associated with online learning called *MOOC*.

Because of the scope within this study, online learning will in this study be limited to describing MOOCs and its defining content within the chosen LMS.

2.2.1 Definition

Sangrà et.al (2012) explains that within e-learning, there are two primary applications online learning and blended learning. Online learning is described as distance education learning where it takes place only online, whereas blended learning is described as a formal education but where a student delivers and receives content through digital media.

Online learning is defined as the use of network technologies (such as the Internet and business networks) for delivering, supporting, and assessing formal and informal instruction. (Shank and Sitze, 2004)

Historically speaking, Shank and Sitze, (2004) write that, it wasn't until the first Web browser was marketed in 1994 that true 'online' learning which is done through the Internet or an Intranet-became what is known as today. Large institutions, non-profits, and universities saw the value in providing training of large numbers of people who were remotely dispersed through the Internet.

There are several terms used to name online learning, for example distance education, virtual education and web-based education. In this thesis, the term online learning will be used.

2.2.2 Challenges and Advantages

There are many challenges and advantages to using online learning. Amongst the advantages are access, flexibility, enhanced communication and collaboration.

People can access the learning content from any place and anytime through their computer.

Truman (2003) explains that because online learners do not have to be at a certain place at a specific time, they have greater control and opportunity to manage their instruction as they see fit. However, this requires that the learners need to possess a strong sense of independence and discipline in order to keep up with the academic demands.

York and Lewin, (2015) add to this statement that the learners can also communicate with each other, collaborate and co-create the learning content they are given access to.

Online learning at scale promises to provide always-on education that is available lifelong and around the globe. Ko and Rossen (2011) states that online learning make the teachers better not only online, but also in their traditional classroom. They explain that there is a heightened awareness of the teacher teaching.

Online learning promotes and enables new learning opportunities for people around the world because of the flexibility and availability of the technology behind it. In general online education can help with providing access to educational programs for people with low-income and who have difficulties with attaining education due to distance problems. (Stewart, 2004)

Stewart, (2004) also explain that online learning may offer one viable strategy for social responsibility by providing significant benefits in the areas of educational access for underserved populations.

Perry and Pilati,(2011) states that research has shown that online learning can be just as effective, if not more so, than classroom-based learning. However, they add that efforts must be made to provide the online learner with a sense of community and to overcome the lack of face-to-face encounters with an instructor.

Over 25 percent of all higher education students in the US in 2008 were taking at least one online class, and online enrolments numbers were growing by 17 percent annually compared with 1.2 percent for higher education as a whole(Allen and Seaman, 2010).

Song, et.al. (2003) wrote a study on the perceived challenges on online learning amongst students. The participants from their study indicated that technical problems, a perceived lack of sense of

community, time constraints, and the difficulty in understanding the objectives of the online courses as challenges.

“Assessment & feedback are the main challenges to making online learning successful.”

-Sanjay Sarma, Director of Digital Learning, Board Member MIT.

There are some challenges in the transition from onsite to online learning.

One of the biggest challenges for online education is to create a personalized, motivating, mastery-learning experience for every student. This is mostly due to the fact that students have different goals and they carry different competencies and backgrounds. (York and Lewin, 2015)

Traditional classrooms require all students to move at the same pace, even though that's too quick for some, too slow for others, and bundled in ways that may not meet learner goals and interests. (York and Lewin, 2015, p 2)

This process is disrupted in online learning. Ko and Rossen(2011) mention pacing considerations and the importance to promote the same type of interaction in order to create a sense of community, as the student is naturally alone once taking the online course.

Online learning can offer a self-paced learning process, everyone is equal online. It only comes down to how much effort the learner puts into the acquiring of new knowledge.

2.2.3 When is learning promoted?

In this section, there will be an introduction of the First Principles of Instruction by Merrill, (2002), summarized by Margaryan, et al, (2005) as the following:

1. *Problem-centred*: Learning is promoted when learners acquire skill in the context of real-world problems. Merrill, (2002) refer to the many theories and instructional models which state that humans learn better when they are engaged in solving problems and building knowledge than when they are presented with information they are required to memorise.
2. *Activation*: Learning is promoted when learners activate existing knowledge and skill as a foundation for new skill. Merrill, (2002) clarify here that if the learner have not had relevant experience then the course should begin by helping learners acquire such experience.

He further explains that this principle is revolved around stimulating the development of the mental models and schemes that can help learners to incorporate the new knowledge or skill into their existing knowledge.

3. *Demonstration*: Learning is promoted when learners observe a demonstration of the skill to be learned. In this principle Merrill, (2002) explain that it is highly important to show the learners what they could do to apply the new information or skill in new situations rather than presenting them information about what to do.

4. *Application*: Learning is promoted when learners apply their newly acquired skill to solve problems. Merrill, (2002) stresses that according to most learning theories feedback is recognized as the most important form of learner guidance.

5. *Integration*: Learning is promoted when learners reflect on, discuss, and defend their newly acquired skill. An example here is when learners are required to demonstrate and defend their new knowledge and skill to peers and others.

Additional expansions of these principles have been developed by (Collis and Margaryan, 2005):

1. *Collective knowledge*: Learning is promoted when learners contribute to the collective knowledge.

A discussion board is an example of this principle, it is targeted for the learners to share and exchange knowledge they have acquired during an online course.

Picciano, (2009) supports this notion by explaining that instruction is not just about learning content or a skill but also about providing learners with both social and emotional support.

He further explains that the discussion board is a good tool to accomplish this and to encourage the learners to think critically about a given topic. The discussion board promotes interaction by enabling the user to share and/or exchange knowledge with each other.

2. *Collaboration*: Learning is promoted when learners collaborate with others.

3. *Differentiation*: Learning is promoted when different learners are provided with different avenues of learning, according to their need.

4. *Authentic resources*: Learning is promoted when learning resources are drawn from real-world settings.

5. *Feedback*: Learning is promoted when learners are given expert feedback on their performance.

2.2.4 Tools and Techniques

A *MOOC* is described as a ‘Massive Open Online Course’. It is a new term that emerged in 2008 in e-learning. It was first introduced by Stephen Downes and George Siemens as they were building a course on theory of connectivism. (Waard, et.al, 2011).

Daniel (2012) quotes Ivan Illich(1971,p.75) by stating that the concept behind MOOCs is 'to provide all who want to learn with access to available resources at any time in their lives; empower all who want to share what they know to find those want to learn it from them; and finally furnish all who want to present an issue to the public with the opportunity to make their challenge known. The first MOOC was created in Canada in 2008 as an online computing course. A *MOOC* is by definition both open and online.

According to Bates, (2014), MOOCs share a combination of the four key characteristics presented below:

- **Massive** in terms of infinite scalability

Downes, (2014) suggests the massive element applies not to the success of the MOOC in attracting many people, but to ‘the design elements that make educating people possible’. He emphasises that: ‘to educate is to do more than merely deliver content, and more than merely support interaction, for otherwise the movie theatre and the telephone system are, respectively, MOOCs’.

- **Open** with no prerequisites for participants other than access to a computer or mobile device and the internet.

- **Online**

MOOCs are offered initially completely online.

- **Courses**

MOOCs are different from other open educational resources, because they are organised into a whole course. Many MOOCs offer certificates or badges for successful completion of a

course.

Rice and Mckendree, (2014) explain that the key aspects of MOOCs are platforms that enable the operations involved to be done effectively. They state that the most established courses are offered by Udacity(www.udacity.com), Coursera(www.coursera.org), and edX(www.edx.org).

These are regarded as the big three MOOC providers of course contents from several major US institutions.

(Breslow et al., 2013) represented by MIT and Harvard wrote a paper on studying learning into edX's first MOOC, which was a MIT(Massachusetts Institute of Technology) course on 'Circuits and Electronics'. Here they explain that edX and Coursera have developed platforms that track students' every click as they use instructional resources, complete assessments, and engage in social interactions. This will be explained in chapter 6.2, where the architecture behind Open edX and the LMS will be defined and presented. This type of data gathered from the students' behaviour during their interaction with the LMS is highly valuable for future research on online learning.

In this study a multidisciplinary team analysed data from the students that enrolled. 155.000 people enrolled for the course, and just over 7,100 people passed the course. Less than 5 % completed this course that they analysed; this is not surprising as the low completion rate is one of the troubling aspects of MOOCs. The general average of MOOC completions is reported to be no more than 10 %.

The researchers examined the students' use of resources by time spent on each resource, and how the demographics and background of the students could be related to their achievement and persistence. In the collected data, they could track users as they progressed through the course, and they could also observe when students chose to stop their participation.

They operationalize 'success' as 'persistence throughout the duration of the course', further they estimate a survival function based on student use of resources. The findings revealed that the use of some resources seemed to predict an increased likelihood of stopping out of the class in the next week. And interactions with other resources seemed to predict a decrease in likelihood of stop out.

An interesting feature they found during the analysis was the student strategy in solving problems. They observed that student strategy differed very markedly when solving homework problems versus when solving exam problems. And discussions were the most frequently used resource while doing homework problems and lecture videos was consumed the most.

Their results revealed that 52 % of the certificate earners were active on the discussion forum. Also, on average, only 3 % of all students participated in the discussion forum.

Guo et al, (2013) present an empirical study on how video production affects student engagement.

They measured engagement by how long students were watching each video during a MOOC, and whether they attempted to answer post-video assessment problems.

Their key finding was that shorter videos are much more engaging, and that informal talking-head videos and Khan-style tablet drawings are more engaging than videos with just PowerPoint slides and code screencasts.

They also recommended in investing in pre-production efforts based on interviews with edX video producers who felt that the planning phase resulted in better videos.

2.2.5 Designing Successful Online Courses

Transforming an onsite course to an online course

Georgouli et.al (2008) presents a framework for introducing e-learning in a traditional course. Here they state that LMS platforms that are based on open source software have shown to be very helpful in reaching the goal of the need for flexible tools that are able to support well-planned learning concepts. (Georgouli et.al, 2008)

They further write that when transforming a course into an e-learning enhanced one, there has to be decisions and actions that are grounded on a careful analysis of the current situation in educational practice. This is highly recommended in order to serve as the starting point towards the development of a successful redesign process. (Georgouli et.al, 2008)

Ferguson and Wijekumar (2000) found the preparation of their material to be the most time-consuming part of the process. The online world is a medium unto itself and if instruction is to be effective, material for online courses needs to be developed with the unique strengths and dynamics of the web in mind (Carr-Chellman and Duchastel, 2000).

Rather, converting your course to an online environment means adapting it to use some of the tools available in the new environment. If you're teaching exclusively online, it involves recasting your entire class in an online shape (Ko and Rossen, 2011, p 46)

The authors further stress that the online course designers should take fully use of the new language of communication. Like the art of translation, course conversion should not merely strive for a word-for-word equivalency, but should allow the new language of communication to be fully exploited (Ko and Rossen, 2011, p 52).

They also emphasize that the aim of any course conversion process needs to be on how you communicate the content along with a focus of the achievement of course objectives.

They present three elements of converting to or creating an online course: *analysis*, *course goals and learning objectives*, and *design*.

For the first element, they recommend the course designer to figure out the role the online learners target group will play in the curriculum, what the basic student learning outcomes are and which resources that is available for both the course staff and learners.

In the second element, they encourage the course designer to define learning objectives and course goals. In explaining the difference between them, they state the objectives are what the students are able to do as a result of learning whilst goals set the parameters of what we will expect to gain from the learning experience. The third element is related to two design principles: make sure that your course objectives are defined in terms of the learning outcomes and that all assignments, activities are aligned with those outcomes.

Henry and Meadows, (2008) have defined a collection of important ideas and suggestions for *teaching excellence* in the online world. The principles include: the online world is a medium unto itself; sense of community and social presence are essential to online excellence; in the online world, content is a verb; great online courses are defined by teaching, not technology.

They list up factors such as creating a sense of community, an effective web interface and ongoing assessment in designing a successful online course.

“In our view, an excellent online course is one in which the student is able to focus on the course itself and the medium of delivery becomes transparent to this process. While technology is the vehicle for online courses, that vehicle is driven by good pedagogy.” (Henry and Meadows, 2008)

Savenye et.al, (2001) state that organization is critical during the design of an online course. The students in an Internet-only course will have only what the instructor provides them and support them in doing. They have little opportunity to clarify directions to an assignment, or check what you really mean or want, face-to-face. Instructors need to be far more organized and far clearer when teaching online. (Savenye et.al, 2001, p 377)

They also stress the importance of mapping the students' characteristics, needs, motivations, and capabilities that they aim to teach. Another important aspect is to consider the types of student motivators and levels of motivation.

2.3 Learning Management Systems (LMS)

2.3.1 Definition

As previously mentioned, there is an increase of the usage of web-based education by universities and organizations these few past years. Web-based education is regarded as education programs such as online courses. Most of these are usually available through a learning management system (LMS).

An LMS is a system which consists of these general features:

- Templates for content pages,
- Discussion forums,
- Chat,
- Quizzes
- Exercises.

Teachers fill in these templates and then release them for learners to use. (Mendoza et al, 2006)

LMS are the most representative e-learning applications. Some are open source, other are commercially provided. The LMS will occupy an ever increasing and prominent role in the teaching and learning process, paving a new road changing the existing ways of teaching and learning.(Georgouli, et al, 2008)

The LMS market was worth \$2.55 billion in 2013 with an estimated compound annual growth rate of approximately 25.2%. The LMS market is therefore expected to be worth approximately \$4 billion in 2015 and over \$7 billion in 2018.²

Watson, et al, (2007) explain that the term LMS is currently used to describe a number of different educational computer applications.

They define LMS as the framework that handles all aspects of the learning process.

An LMS is the infrastructure that delivers and manages instructional content, identifies and assesses individual and organizational learning or training goals, tracks the progress towards meeting those, and collects and presents data for supervising the learning process of an organization as a whole. (Szabo and Flesher, 2002)

² <http://www.marketwired.com/press-release/learning-management-systems-market-worth-783-billion-2018-forecasted-marketsandmarkets-1845977.htm>

Gillhooly, (2001) state that an LMS delivers content but also handles course registration and administration; skills gap analysis, tracking and reporting.

These types of systems provide access control, provision e-learning content, communication tools, and administration of user groups.

An organization or institution which wants to use an LMS can either acquire, implement and deploy or develop their own custom-based LMS.

In essence, Greenberg,(2002) states that an LMS is a high-level, strategic solution for planning, delivering, and managing all learning events within an organization, including online, virtual classroom, and instructor-led courses. It is regarded as the framework that handles all aspects of the learning process.

According to (BrockBank,2003) an LMS ties six e-learning components: (1) content, (2) collaboration, (3) testing and assessment, (4) skills and competency, (5) e-commerce and, (6) internet video-based learning in a framework that tracks, supports, manages and measure e-learning activities. It must also address the needs of the ultimate end user that is the learner.

An LMS has key features that allow students to be actively involved in their courses. (Lewis et al., 2005)

In this context I will define the LMS as the software that manages and delivers a learning framework in the format of an online course.

2.3.2 Requirements/Guidelines for a good LMS.

Lewis et al., (2005) presents and discusses the various standards and components a proper LMS should provide for an efficient learning process online. Amongst those are discussion area, audio/video, site administration, student study tools, and naturally a good navigation and interface. These components are quite important in a student's learning experience.

Following below is a presentation of general characteristics of an LMS provided by Bailey, (1993):

- Course ware that extends several grade levels in a consistent manner.
- A management system that collects the results of the students' performances.
- Lessons are provided based on the individual student's learning progress.
- Lessons are incorporated into the standardized curriculum

- Instructional objectives are tied to individual lessons.

(Vai and Sosoulski, 2011) presents a table of where they summarize the most basic features that an LMS may consist of:

Feature	Definition
Syllabus	An overview of the course in outline form. Objectives, requirements etc.
Calendar	Schedule of deadlines and course events.
Teacher Announcements	Teacher updates and reminders.
Course Email	Correspondence between course member
Lessons	Content sections usually organized by topic
Discussion Forums	Ongoing online voice or text discussions
Wiki	An online environment that can be shared and edited by all members of a collaborative team.
Blog	An online space where one author creates a posting in the form an article, critique or some type of narrative, and others comments.
Testing/Quizzing	Assessments that determine how successfully outcomes have been achieved. Ungraded self-assessments help learners adjust the pace of and reflect on their learning.

Table 2.3 Sample Learning Management System features list- asynchronous by Vai and Sosoulski,(2011)

The LMS should be able to create pedagogically sound course content and learning objects easily and efficiently. A learning object is defined as the smallest reasonable unit of learning material; one example is an animation clip that describes how a dangerous procedure is completed safely. (Nokelainen, 2006)

The LMS should have all the necessary e-learning tools for assessment, communication, collaboration, and community building, as well as for the creation and management of online learning courses. (Lewis et al., 2005)

Once learners complete a course, the LMS can administer tests based on proficiency requirements, report test results, and recommend next steps. (Greenberg, 2002)

Shown below are guidelines on the components of a good LMS organizations should attain during a

selection. (Mendoza et al, 2006)

- The LMS must conform to the minimum definition of LMS
- The LMS has been used within the country
- The evaluation group had positive experiences with the LMS or heard positive comments about it from others
- The LMS supports multiple languages
- The LMS server runs on multiple operating systems
- The LMS integrates homogeneously the learning environment
- The LMS has basic documentation available
- The LMS is compliant with eLearning standards³
- The LMS organization has an active development with at least 2 full time developers (only for Open Source)
- The LMS organization has an active support community (only for Open Source)

Table 2.4LMS guidelines Mendoza et al, (2006)

They base these guidelines on a review in the literature on LMS selection.

They have identified three criteria for selecting an LMS for an organization. These are defined as to:

1. Perform an initial study for the organization
2. Preselect the LMS from the dozens in the market.
3. Evaluate the LMS preselected

³ ELearning standards refer to a system of common rules for content, authoring software and LMSs.

They are rules that specify that courses can be created and delivered over several platforms so that they can operate seamlessly (Adina, 2007).

3 Background

3.1 HISP

In this chapter, I will present the background of the global network where this research is being conducted in. Later in this chapter there will be an introduction of the Academies that serves as an important component within the organization.

HISP (Health Information Systems Project) is a global action research network which is based and initiated at the Department of Informatics at the University of Oslo (HISP UiO).

The project has its roots in post-apartheid South Africa in the second half of the 1990s.

The core focus of HISP UiO is DHIS 2, its implementations and related capacity building in countries and regions. DHIS 2 is open source software which is developed and implemented through a network of partners (The HISP network), this will be further explained in the following sub-chapter. The HISP approach to research is regarded as a participatory action research (PAR) approach. PAR is a research approach which is based on reflection, data collection, and action that aims to improve health and reduce health inequities through involving the people who, in turn, take actions to improve their own health. (Baum et al., 2006)

The software is used for reporting, analysing and disseminating data for all health programs. It is described as a shared and integrated data warehouse for essential. The tool is implemented in more than 40 countries, and it is also a national standard in 12 countries.

The research approach of HISP is stated as an action research and information systems design, it is also regarded as a participatory design project. (Braa and Sundeep, 2012) The focus in the earlier participatory design projects was on empowering workers who were affected by or threatened by new technology, by exploring ways in which their influence over technological alternatives by involving workers in cooperative design at the workplace. (ibid)

Braa and Sahay, (2012) further state that later projects in Action Research shifted toward actively producing technological alternatives by involving workers in cooperative design at the workplace. This type of approach is now regarded as a participatory action research design as mentioned earlier above.

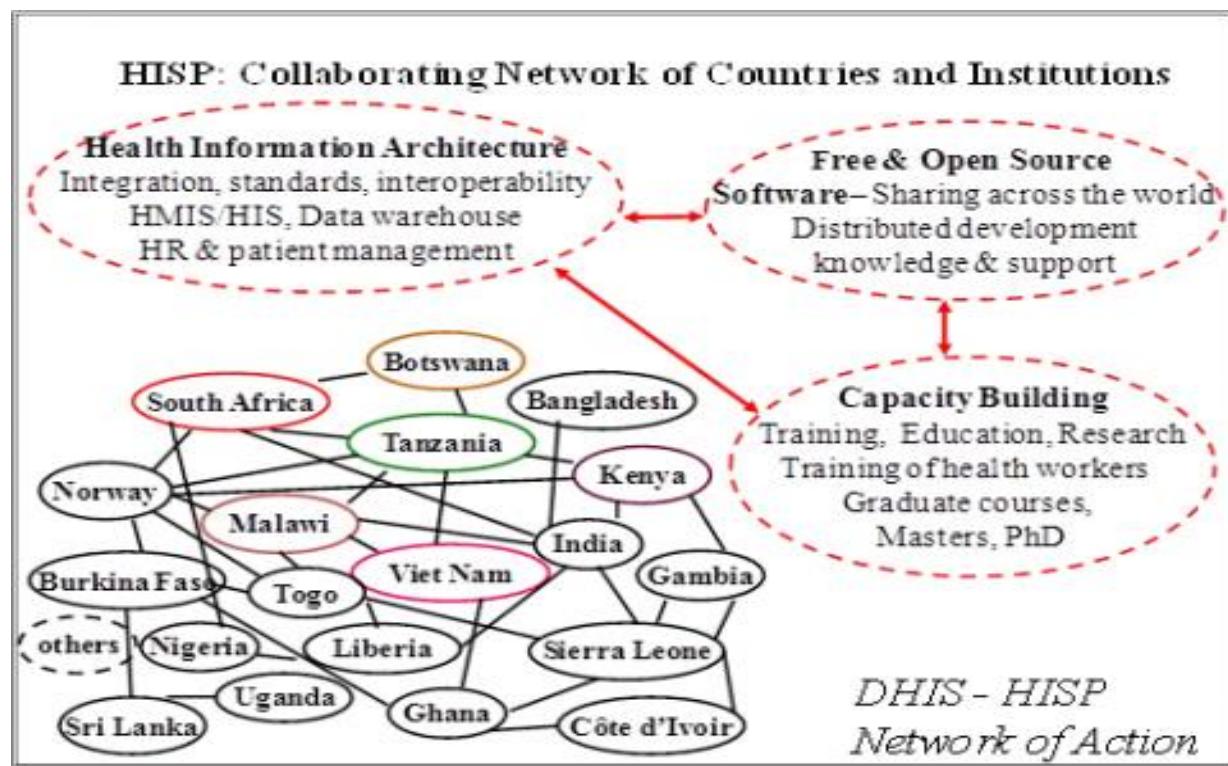


Figure 3-1 An illustrative display of the Network of Action behind HISP

3.2 DHIS 2 Software

DHIS 2 is a network enabled application and a browser-based application. It can serve three deployment alternatives, over the Internet, a local intranet and as a locally installed system.

On the DHIS2 website the software is described as a powerful set of tools for data collection, validation, reporting and analysis. It serves as a data collection, recording and compilation tool, and all data (numbers or text form) can be entered into it. The software can be used to increase data quality, by performing system checks to user data entries. These types of checks help to ensure that data entered into the system is of good quality from the start.⁴

When data has been entered and verified, DHIS 2 can help to make different kinds of reports. Graphs, maps, reports and health profiles are among the outputs that software can produce.

In the first phase of the usage of the software, the user must create meta-data (data about the data), this describes what is to be collected (data elements and categories), where it should be collected (organization units) and how frequently it should be collected (periods).

This can be done through the user interface. The Data Element is regarded as perhaps the most

⁴ <https://www.dhis2.org/doc/snapshot/en/user/html/ch06.html> [Last retrieved 23.11.2015]

important building block of a DHIS 2 database. It explains the factor that is being collected or analysed. It often represents a count of something, and its name describes what is being counted, e.g. “BCG doses given”.

The Dataset is a collection of data elements grouped together for data collection.

It has a period type which controls the data collection frequency (daily, weekly, monthly, quarterly, six-monthly, or yearly). It is defined by the user together with a name, short name and code.

In order to use a dataset to collect data for a specific organization unit the user has to assign the organization unit to the data set.

Once the user has assigned a dataset to an organization unit then that dataset will be made available in Data Entry. A default data entry form will then be displayed, which a list of the data elements belonging to the dataset together with a column for the input of values.⁵

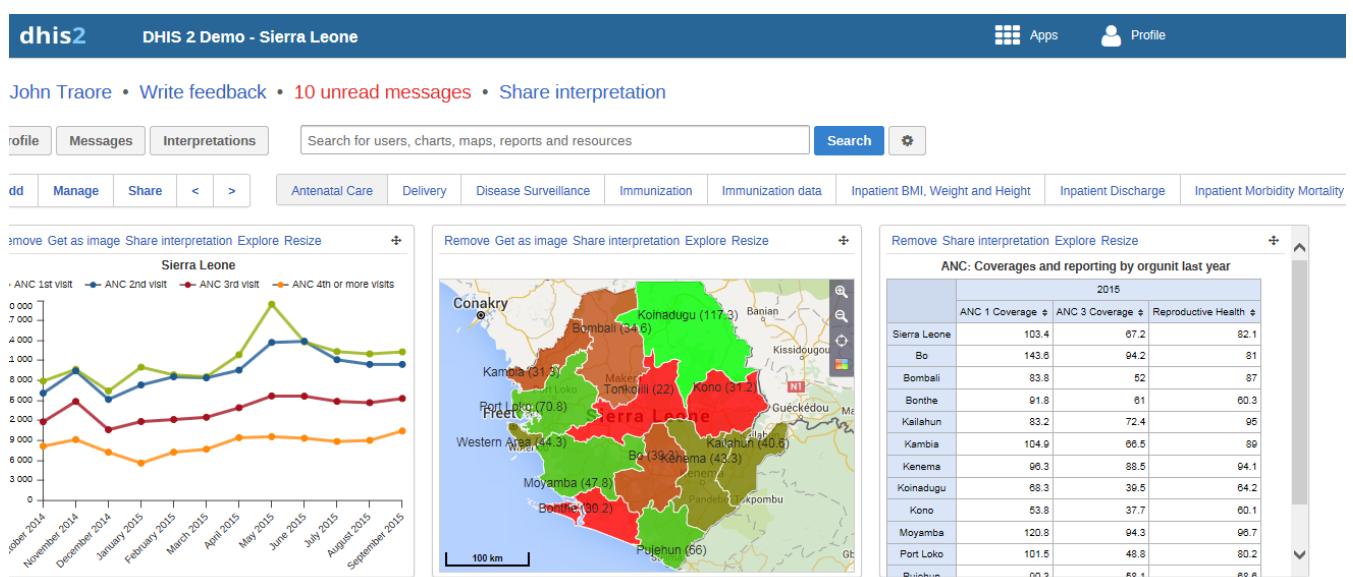


Figure 3-2 An example of a front-page DHIS 2 User Interface.

The DHIS 2 functionality is organized into applications. The applications are stored in the web server, and they can be run in browsers independent of the device.

Together with the software there is a user documentation which covers the background and purpose of DHIS 2 together with instructions and explanations of how to perform various functionalities such as aggregation and reporting. There is also an end user manual which is described as a light-

⁵ <https://www.dhis2.org/doc/snapshot/en/user/html/ch06.html> [Last retrieved 23.11.2015]

weight version of the user documentation. This is meant for end users such as district records officers and data entry clerks.

3.3 The Academies

The DHIS 2 Academy is a training program that is run between 8 and 12 times annually in five sub regions (Western and Central Africa, Eastern Africa, Southern Africa, Asia and Latin America) around the world. HISP UIO established this training program in 2011. A typical Academy lasts for 10 days, and a typical day lasts for 7.5 hours. The Academy brings together a diverse group of participants that range from ministries of health, implementing partners, NGOs, Academia, private companies or individual consultants.



Figure 3-3 Held (dark-blue) and Planned (light-blue) Academies in 2015.

The DHIS 2 Academy aims to strengthen national and regional capacity to successfully set up, design and maintain DHIS 2 systems. It is a training program which includes both theoretical/conceptual and practical sessions, where the participants learn the principles of the DHIS 2 design, and how to set up and maintain DHIS 2 to support their organization's data collection, analysis, and reporting needs.

The Academy has since 2013 gradually introduced 2 additional levels in the different regions where the Academy is set up. The potential participant can choose between 3 levels of training.

The first level is based on the fundamentals and it covers all the important areas of DHIS 2 setup and maintenance, from database design to reporting outputs and data analysis tools.

In the table below, an example of a typical day at the Academy is shown.

As observed, data use workshops(named practical assignment in the table) are part of the Academy as it is used in implementation projects to improve data quality and data use.

Time	Session	Details	Learning Objectives	Facilitator(s)
Day 2	(Wednesday)			
08:30-09:00	Recap of previous days learning		Reinforce previous days learning	Participant group
09:00-09:30	Data Elements & Categories	Data elements, categories. Presentation and live demo.	Understand the concepts og data elements, categories.	Ismail
09:30-10:00	Data Sets and Forms	Data sets and forms. Presentation and live demo.	Understand the concepts of data sets and forms.	Ismail
10:00-10:30	Practical assignment- Data Elements, Categories, Data Sets and Form	Create data elements, categories etc. Make groups and group sets.	Create a data set with data elements.	Groups
10:30-11:00	Tea Break			
11:00-12:00	Practical Assignment- Data Elements, Categories, Data Sets and Forms	Create data elements, categories etc. Make groups and group sets.	Continuation	Groups
12:30-13:00	Introduction Tracker Program		Set up tracker to monitor patient level program	Emma
13:00-14:00	Lunch			
14:00-15:00	DHIS 2 Country Stories	A 5 minute presentation on what the countries and organization are doing with DHIS 2.	Describe you country/organization in terms of the information cycle.	Sele
15:00-17:00	Practical Assignment Multiple Stage Program			Groups

Table 3.1 A typical day at the DHIS 2 Academy in South-Africa.

In this level participants are being introduced to various aspects such as how to choose appropriate routine data collection and reporting methods for different health care settings and how to create standard data sets with data elements with the DHIS 2. These are some examples of what the

participants should be able to learn at the end of the course.

The academies are usually held at conference venues at hotels or nearby hotels.

As seen in the table the participants are being set to work in groups during the practical laboratory sessions, this type of cooperation is normally set to begin from the second and last until the eighth day of the 10-program.

An example of a typical exercise participants may receive on a DHIS 2 Academy is shown below:

DHIS 2 Basic Academy Indicators Assignments
<p>Instructions: For all indicators in blue, identify the numerator, dominator (denominator?) and the factor and build them into DHIS2. All these indicators should be taken home and build on the national DHIS 2 instances.</p> <p>Goal 4: Reduce Child Mortality</p> <p>Target 4. Reduce by two thirds, between 1990 and 2015, the under-five mortality.</p> <p>4.1 Under-five mortality rate 4.2 Infant mortality rate 4.3 Proportion of 1 year-old children immunised against measles</p>

Table 3.2 An example of an exercise on the DHIS2 Academy.

At the completion of the program the participants receive a certificate. The pass grade is 70 % and is divided in as the following:

1. **Prerequisite:** Attendance: 80 % minimum. Here the participants sign in twice a day.

2. **Group Assignments:** counts for 60 % of the grade:

This is where the participants conduct short assignments in their groups which they later upload to Moodle, which is the LMS that is in usage at the Academies.

3. **Final Assignments:** This assignment is individual and counts for 40 % of the final grade.

The certificate is issued by the University of Oslo and normally the health ministry of the current country the Academy is being held in. There are no credits received upon the course completion.

The second and third level target experienced DHIS 2 implementers who have already completed the first level. In these two levels the participants will achieve a more detailed learning of database

management, advanced trouble-shooting, custom reporting outputs and server maintenance.

During these training programs DHIS 2 Experts are hired as trainers and facilitators who guide the participants on the practical work with their databases.

4 Methodology

In this chapter I discuss the methodology that was used for obtaining data.

The thesis is based on the use of mixed-methods which consist of qualitative and some quantitative studies. The chosen research method is AR.

The research paradigm is interpretive due to the fact that the chosen research area is complex and new for the organization. Also, the aim of the research is to understand the phenomena of online learning in order to fully apply it as a strategic component.

Interpretive methods of research in IS are “aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context” (Walsham 1993, p 4-5). The research is part of the organizational strategy where they have a collaborative approach based on AR.

This will be introduced in the following sections.

4.1 Action Research

In this section, I will discuss AR as a method with references to relevant literature.

Susman and Evered, (1978) explain that action research can be viewed as a cyclical process with five phases; diagnosing, action planning, action taking, evaluating and specifying learning..

The figure below show how these five phases occur in this process. AR was chosen because of these five phases which became suitable for the research context. Susman and Evered, (1978) present six characteristics that represent some of the objectives of AR. These will be outlined later in this chapter. I've chosen AR for this research based on these characteristics and its iterative cycle where learning is important through all the five phases.

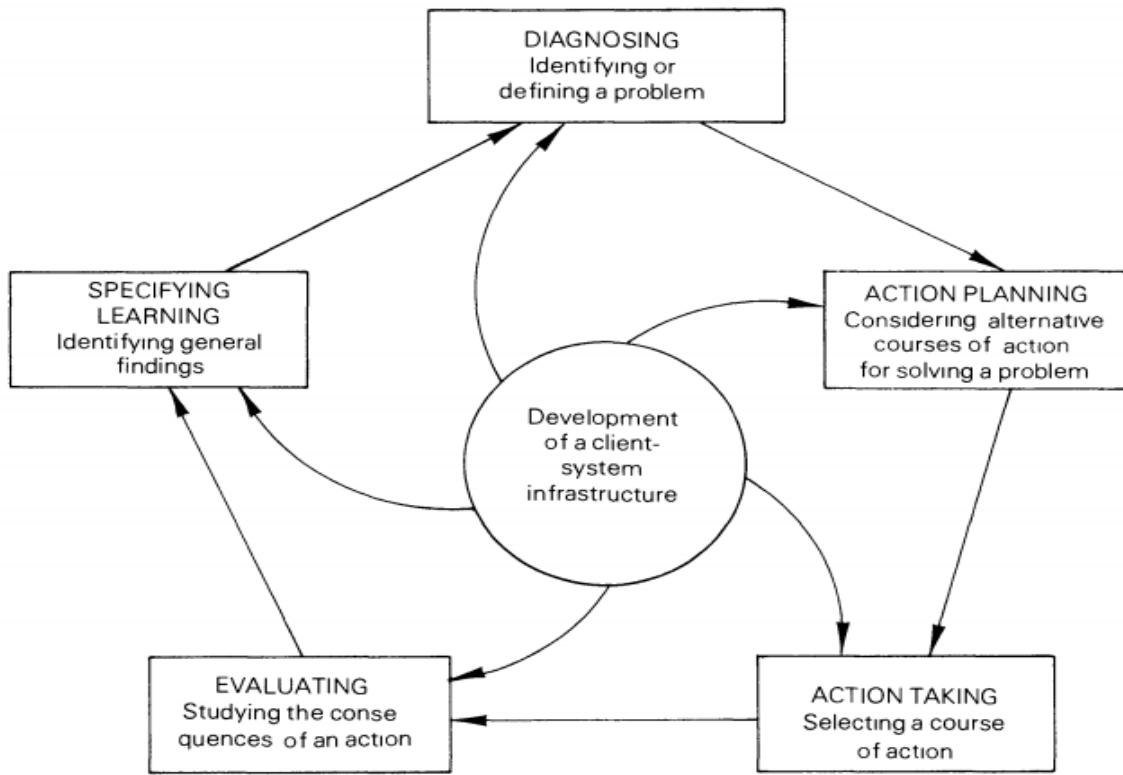


Figure 4-1 An Iterative cycle in Action Research. (Susman and Evered, 1978)

The five phases are: diagnosing, action planning, action taking, evaluating, and specifying learning. (Susman and Evered, 1978) consider all the five phases to be necessary for a comprehensive definition of action research.

The first phase is *diagnosing*, where the researcher, together with the practitioners (the researched), identify the problem that needs to be solved. In the next step, *action planning*, a plan is laid out for how the diagnosed problem can be solved.

In the third phase, *action taking*, the planned actions are executed. The fourth step is *evaluating* the outcome, and the fifth and last phase is to *specify the learning*, that can be gained from the cycle. Susman and Evered, (1978) list up six characteristics of action research; these are representatives of the methods and objectives of key developers and practitioners of action research (A.R).

A short summary of some selected characteristics with reference to my research are presented below:

A.R is future oriented. Here they state that action research is oriented toward creating a more desirable future when the researchers are dealing with the practical concerns. The planning process

is quite essential and useful in this aspect of action research. As mentioned earlier, one of the strategies of the Academies is to conduct several online courses in different levels as part of their future portfolio.

A.R implies system development. In this aspect, the action research process aim to build the necessary system and also to build the appropriate structures. The focus here is on generating the necessary communication and problem-solving procedures. (Susman and Evered, 1978, p 589) This is especially relevant for online course, as mentioned earlier there will be designed and implemented necessary guidelines for the course. There will also be designed interactive functionalities within the system.

A.R is situational. Action research is situation-based and context-based. The aim behind the online Academy is to implement a course that has certain time limits and deadlines.

Susman and Evered, (1978) further explain that in the action research cycle, findings will emerge as action develops, but they are not conclusive or absolute. The evaluation may lead to a new diagnosis, and the cycle is repeated. There are multiple methods that could be used in this research method:

- Interviews
- Observations(passive/participant)
- Document analysis(specifications, task descriptions, guidelines)
- Video/Photo

Rapoport(1970) defines action research in the following way:

Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework (Rapaport, (1970) p. 499).

It emphasizes collaboration between researchers and practitioners. It is an important qualitative research method for the information systems field (Baskerville and Wood-Harper, 1996; Lau, 1997; Myers, 1997; Avison et al., 1999).

This definition draws attention to the collaborative aspect of action research and to possible ethical dilemmas which arise from its use. The only main ethical concerns during this research will be to ensure consent with interview subjects, and to provide an informed consent document.

This will be discussed more in a later subsection regarding the data collection.

Clark (1972) emphasizes, that action research is concerned to enlarge the stock of knowledge of the social science community. It is said that it is this aspect of action research that distinguishes it from

applied social science, where the goal is simply to apply social scientific knowledge but not to add to the body of knowledge.

Kemmis and McTaggart (2000, p 595) describe action research as participatory research. They state that action research involves a spiral of self-reflective cycles of:

- Planning a change.
- Acting and observing the process and consequences of the change.
- Reflecting on these processes and consequences and then re-planning.
- Acting and observing.
- Reflecting.

The authors explain that the stages will probably *overlap* and that the initial plans will become obsolete in the light of learning from experience.

During the reflection process, learning will be a very important aspect for the practitioners behind this research, as they are the ones who will continue the started intervention.

Shown below is a customized model of the AR cycle which reflects the research process in this study.

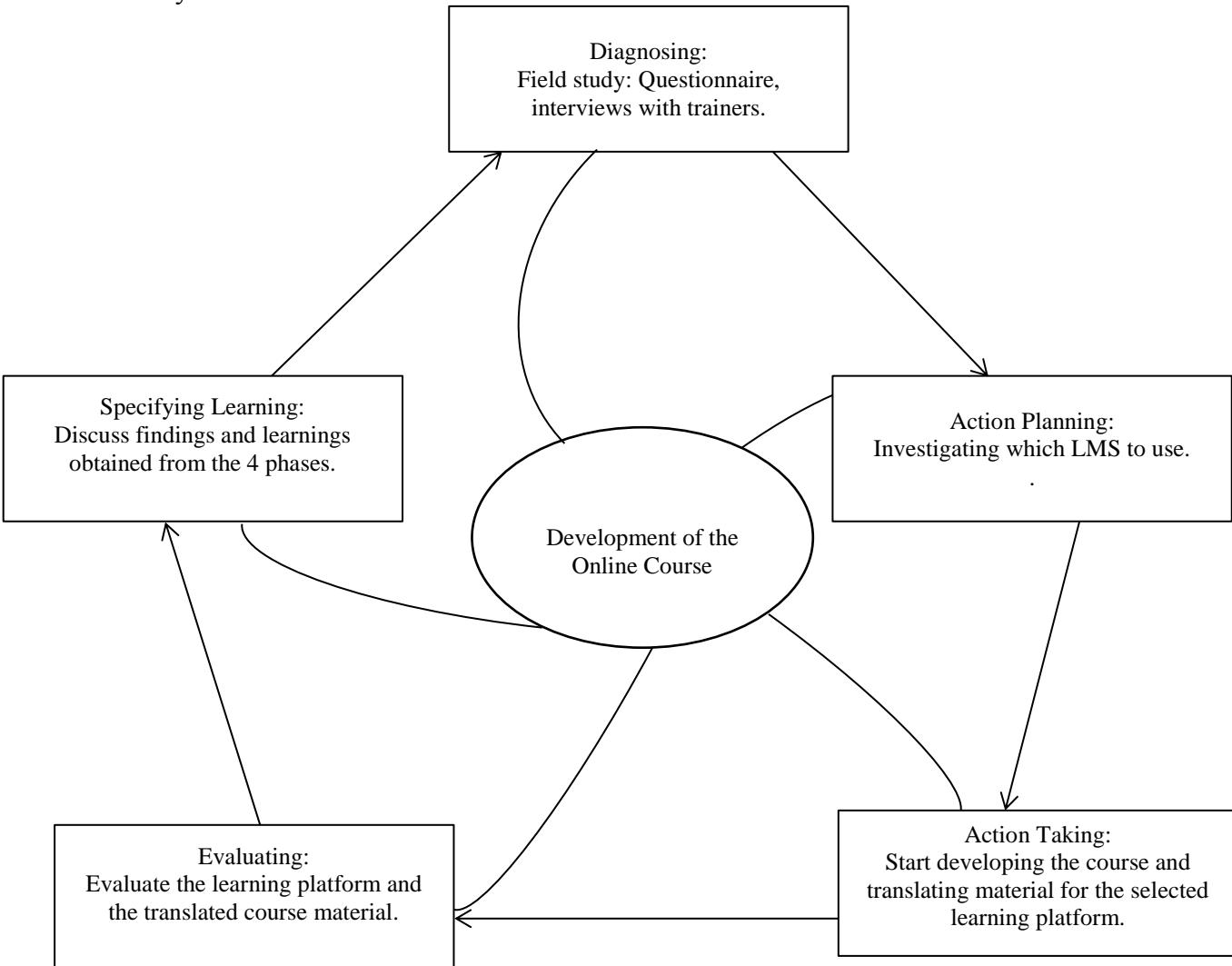


Figure 4-2Customized AR Cycle (Susman and Evered, 1978)

Diagnosing:

In this phase the aim is to collect data on the viewpoints on an Online DHIS2 Academy from trainers and participants on the onsite Academy. And thereby study the data to investigate this area.

Action Planning:

Here the focus is to explore various LMSs and select one based on the guidelines by Mendoza et al, (2006) and specified requirements and needs from the practitioners.

Action Taking:

In this phase the focus will be on the work with the development of the learning material outside of the learning platform. This will then be moved into the learning platform and inserting a pre-survey, videos and other elements that need to be present in the design of the course.

Evaluating:

In this phase an evaluation of the CMS and LMS behind the platform will be conducted. In addition the learning material which will be part of the online course will be evaluated.

There will also be conducted a usability evaluation method, *think-aloud* where a few selected test participants will be observed while conducting tasks on the prototype.

Specifying Learning:

In this phase I will discuss the findings obtained from the translation process and the think-a-loud user test as well as the reflection on the learnings of the work conducted within the four previous phases.

Meyer, (2000) describes action research as a process that involves people and social situations that have the ultimate aim of changing an existing situation for the better. She also states that the action research's strength lies in its focus on generating solutions to practical problems.

In action research the knowledge is created through action and at the point of application. The knowledge is also co-created through the cooperation between researchers and practitioners.

Action research (AR) emphasizes collaboration between researchers and practitioners. It is an important qualitative research method for the information systems field (Baskerville and Wood-Harper, 1996; Lau, 1997; Myers, 1997; Avison et al., 1999). The knowledge produced in action research can be both regarded as positivist, interpretive or critical. As mentioned earlier, this study uses an interpretive AR.

Another important aspect of action research is to improve work processes, understand the underlying causes and also to connect theory and practice. This research method is highly practical-orientated. The typical action researcher has a vision on how the reality should be perceived. The researcher wants to test out a theory in a real-life setting, and then get feedback from this experience. The next step is to modify the theory as a result of the feedback, and then test it out

again in the same setting.

Action research focuses on addressing a situation where problems as seen by the practitioners exist. The focus of the methodology for this thesis is regarded as a problem-driven initiation. This is because of the overall research topic which seeks to address the growing requests and need for more training and education within the organizations community.

There might arise conflicts in action research especially due to the collaborative aspect of the method. Avison, et al, (1998) state that the researchers and practitioners may not share the same values and they are likely to have different goals.

On the other hand, action research is also concerned about solving practical problems confronting the organization in which the research is embedded. (*ibid*)

They further explain that it is this dual task of combining both practical action and research which can potentially lead to conflict.

4.2 Empirical Setting

The primary goal of introducing an online course is to build more capacity, whereas the sub goal is to reach out to people beyond the on-site academies.

Based on the initial observation and interviews with the trainers and the Academy coordinator there was also an underlying wish to create an online community and have it mostly self-sustained. The Academy wants to train people more often and they want to reach more people to train by having online courses. The target group remains the same for the online courses; which is the potential users of DHIS 2 at a beginner's level.

The research area of this thesis is to create an online course for potential users of the software.

As part of the research method of AR, see section 4.2, I had an active role within the team of practitioners; I translated course material into screencasts from trainers during a field study abroad. These were later edited in a screencast software tool.

I also partook in the creation of the online course in the CMS and LMS, where I created Pre-surveys and implemented videos in the CMS of the learning platform.

The data collection consisted of qualitative material as well as some quantitative material in the forms of surveys:

The research team consisted of me and the Community Coordinator for the DHIS 2 Academy at HISP Oslo. Later in the research project, a PhD candidate within the same research group joined the project.

The empirical study for this research was conducted from November 2014 - November 2015.

In order to understand how the onsite Academy was run, I participated in a field study from 24.november 2014-04.december 2014 in Tanzania, which was where the DHIS 2 Academy Level 1 was being held at that time.

Post to this time period the rest of the empirical work was conducted in Norway.

In the beginning of the research, an open source learning platform, Open edX, was selected by the practitioner (community manager of DHIS 2 Academy) and me , this choice was based on system

requirements and needs, document reviews and interviews.

Throughout the research project, I also conducted a technical evaluation of the learning platform behind the learning management system which will be presented.

The study then discusses the design environment of the selected learning management system.

I translated course material into screencasts from trainers during a field study abroad.

These were later edited in a screencast software tool; details of this process will be elaborated more on in chapter 7.

Field study abroad:	Field study Norway:
<ul style="list-style-type: none">• 8 Interviews with trainers and participants at the onsite training program venue.• 1 questionnaire for onsite participants	<ul style="list-style-type: none">• 1 Interview with 2 senior advisers within the Digital and Media Learning group at University of Oslo.• 1 Informal Interview with 1 of the previously mentioned senior adviser.• 1 Interview with an Open edX experienced users: 1 senior adviser system developer working with test projects for colleges in Norway and other organizations.• 1 usability evaluation workshop with 4 test participants with health backgrounds.

Table 4.1 Overview of data collections and data disseminations

The idea is to introduce several courses which can work as self-paced courses in addition to the ones that are restricted to certain start and end-dates. However in this first part of the project, the plan is that the online course will not be self-paced but restricted to a time frame.

The overlying goal is to create an online course which can work as a standalone module.

4.3 Data Collection Methods

4.3.1 Interviews

There were several interviews that were conducted during the field trip. The majority of the data collection is interviews.

The interviews were conducted with the trainers and some selected participants during the field trip. I designed in-depth interview guides which were semi-structured.

This was done in order to have some structure but at the same time have the liberty to let the interview subjects speak freely of the general topic or come up with new topics. All interviews were tape recorded.

4.3.2 Observations

I made participant-observations during the teaching and lab sessions. This was very valuable in order to see what type of areas the participants asked for help in. Another aim behind the observation was to see how they interacted with the trainers during the lab sessions. As mentioned earlier, the research paradigm chosen is interpretive; this choice is partly due to the interpretive approach that lies within participant-observations as research method approach.

In the evaluation phase, a usability method called Think-a-loud was conducted.

Four participants with health backgrounds (one medical student, one nurse and one pharmacist) partook in the evaluation. They had the following background:

- 1 Medical student, 4th year.
- 1 Pharmacist.
- 1 Nurse who has 5 years of work experience.
- 1 Doctor who has over 25 years of work experience.

A consent form was provided to each test participant, explaining that the test data would only be temporarily stored and deleted after the end of the study.

4.3.3 Field Notes

I gathered field notes during the observation of the participant and trainers and also when I spoke to the participants during the breaks of the teaching sessions. I also wrote down some remarks regarding the presentations and lectures during the Academy.

4.3.4 Surveys

A survey methodology was used for the data collection. I requested all the participants to fill out a questionnaire which was designed with questions related to the future of an online DHIS 2 Academy. The aim was to find out the participants motivation for an online course and the content they would want in an online course. It was also conducted because the participants in the Academy are potential learners of the online Academy, but more on a higher level course in the future. The survey had 43 respondents. I applied Histograms in MS Excel to display the results of this analysis.

5 Diagnosing

In this chapter, I present the background for the decision behind the online course as well as the results on the questionnaire that was conducted during the onsite Academy.

The questionnaire guide is provided in the Appendix.

The community coordinator for the DHIS 2 Academy created a strategic document that outlined the reasons behind the need for an online platform to train more people more often:

The diagnosis by Pinard(2014) is described further with the following details:

- Not all the participants have the same level in IT knowledge.
- There is a need for more training material for the nodes to perform local training.
- The refreshment trainings that are key elements in the capacity building process are not organized as often as they should.
- There is a rapid increase in the scope of the DHIS 2 software as well as diversity of users, so we are not able to provide on-site/physical academies for all the combinations of topics X level that we would like to do.

The limitations of the current on-site Academies are described as following:

- The frequency of the event.
- The learning process is limited to the duration of each Academy.
- The size of the event.
- The typology of the attendees.
- The participation fees.

The answers to these problems can be addressed with the development of an online training course.

The advantages with an online course for the Academy are described as following:

- The student can participate in the online training when it is suitable for he/she.
- An online program can open up for continuity in the learning progress.
- It could allow for a better representation of the DHIS 2 Community of users.
- An online program can open up for a low fee or even a no fee to reduce the entry barrier.

5.1 Field Study

The facilitators in the DHIS 2 Academy Level 1 were DHIS 2 Implementers and trainers from Tanzania, South-Africa, Switzerland and Uganda. The program for the Academy was a combination of presentations on the use of the various applications within DHIS 2, and DHIS Mobile, along with practical demonstrations on the demo.

Even though the Academy was a beginner level on DHIS 2, some of the participants had some experience with DHIS 2, while others were completely new to the system.

The countries at the workshop were on different stages in their implementations, and there were some organizations who attended the Academy because they wanted to begin an implementation of the system. The final grade of the exam consists of group assignments, attendance and a final quiz. The pass grade was 70 % of the final grade.

At the first day of the event, the facilitators explained the learning objectives, curriculum and the various sessions for the coming two weeks. One trainer explained throughout the introductory session on the first day, that the DHIS 2 software was a tool to improve health services and the type of decision makings that are done at various levels. The trainer explained that the overall learning objective was to create evidence-based decisions on information.

Another trainer explained that the core focus was to be on the indicators, and that the participants would spend good amount of time on identifying indicators. Another practical learning objective of the course was to teach the participants how to convert these indicators into maps, graphs and tables, and then disseminate that same information. The trainer explained that the DHIS 2 was at the center of these four steps.

It was also explained that the biggest problem with any information system was data quality.

During the first day, a pre-test was conducted; however the trainer who designed the pre-test explained to the participants that it was only relevant to those of the participants who had interacted with DHIS 2 before. This was done in order to get an idea of the type of knowledge the participants who had experience with the software had acquired.

The learning objectives for the participants during this course were to:

- Manipulate pivot tables to analyze data
- Make new indicators with numerator and denominator
- Develop basic standard reports, based on requirements of program managers
- Use Data Visualizer to make graphs
- Prepare a GIS map
- Develop dashboards
- Use DHIS2 to present analyzed reports
- Set up a DHIS2 user group for a district
- Provide analyzed information for a DHMT

Table 5.1 Learning Objectives from the DHIS 2 Academy Level 1

During this field trip a triangulation of interviews, observations and field notes have been used for the data collection process.

This Academy was held for participants who were from a variety of different professional backgrounds. The participants were DHIS 2 Implementers and technical staff who wants to set up, design and maintain DHIS 2 in their respective countries or organizations.

At the end of the last day, I held a short presentation on the concept and goal behind the Online Academy and asked the participants to answer a questionnaire on their views of on an online course.

5.2 Overview of Data

In the first question of the questionnaire we asked the participants, 22 people feel that all of the sessions could be taken online.

It is also notable that 17 people feel that the sessions could be online up to a certain extent. This could have a relation to the type of content the participants feel would be suitable in an online course. More than 9/10 can see themselves taking the content online. From this we can see that there is a possible motive for an online component and module based on the respondents answers.

In this section I will now discuss the questions and the responses.

1. How likely are you to ask a facilitator for help ONLINE?

I asked the participants if they would approach a facilitator for help online if they had trouble with a task. 20 people felt that they would very likely do so, and 19 people felt that they likely would do so. The majority of the respondents would want the presence of a facilitator/moderator when they are engaged with the online course. During the observation of the participants on the onsite course, I noticed that the majority of the participants had a lot of interaction with the trainers, and that they needed practical help a good amount of the time.

2. How willing are you to participate in an online forum?

In the question of the willingness to participate in an online forum, 23 participants responded that they would be very willing and 12 people would be moderately willing to do so.

The majority is positive for online interaction with each other. 8 people were somewhat willing to engage in an online forum, and no one responded that they were not willing at all.

It was also observed during the onsite course that the participants went to each other for help with their practical sessions on the computers. This could imply the chance of reaching out to each other online for questions and practical help as well.

The outcome of the question of whether an online certificate would be more valued than an onsite certificate was surprising; the hypothesis for this was that the majority would prefer an onsite Academy Certificate more than online Academy Certificate. 13 people felt that an online Academy was actually more valuable and the majority (25 people) felt that it was equally valuable. It was only a small minority (6 people) who felt that it was less valuable.

The concluding remark is that almost half of the respondents actually viewed an online certificate as valuable as an onsite certificate.

In order to find out the participants expectations and motives for taking an online course we asked how long they would see themselves spending on the course weekly. We felt that this could help us figure out how to design the course material in terms of length, and that if they saw themselves spending lesser time a week then we would also need to adjust this in the learning material in the online course.

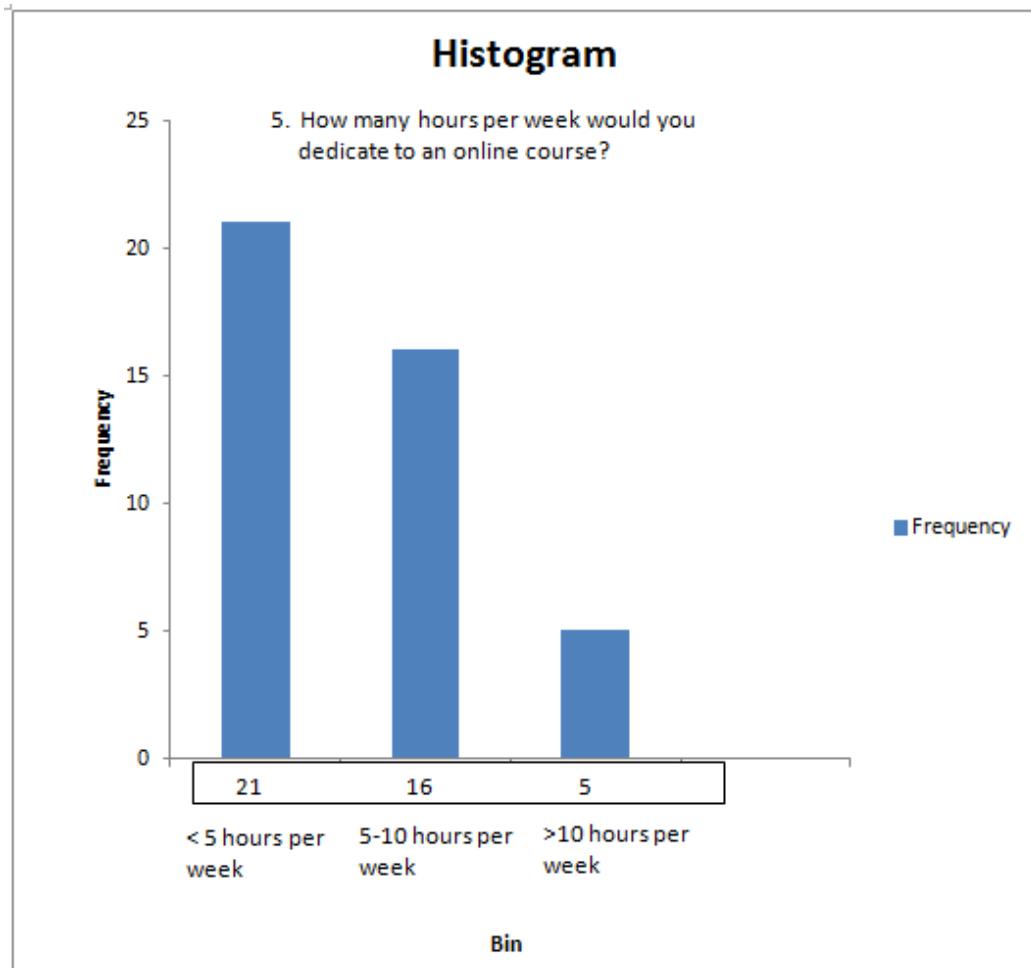


Figure 5-1 Histogram Question 5

The majority (21 people) responded that they would only dedicate less than 5 hours per week for an online course. 16 people would spend between 5-10 hours per week, and 5 people saw themselves spending more than 15 hours on an online course.

It would be interesting to find out if these people were thinking of an online course as something they would use in regards to their job, or if they saw these hours as part of their work time. Almost half of the respondents (23 people) can see themselves dedicate 5 or less than 5 hours a week.

Well aware that the representative for this questionnaire cannot be generalized, we asked if they had ever taken an online course from beforehand. In this context we could then assume that the potential target group who consist of the same type of various backgrounds as the onsite participants that I met, would give us an indication of their experiences with online learning.

4. Have you taken an online course before?

The majority of these respondents (26 people) had taken an online course from before, while 18 respondents had not taken an online course. Over half of the respondents had experience and general knowledge around the structure of an online course.

During one conversation I had with one of the participants from Rwanda, he explained that he had also taken a part-time study of a degree online from an American university.

In order to find out the type of presentation of the learning material the participants would prefer online, we asked them whether they preferred videos, online documentation, screencasts and recorded interviews. The majority (19 respondents) would prefer videos and 13 respondents would like to use screencasts.

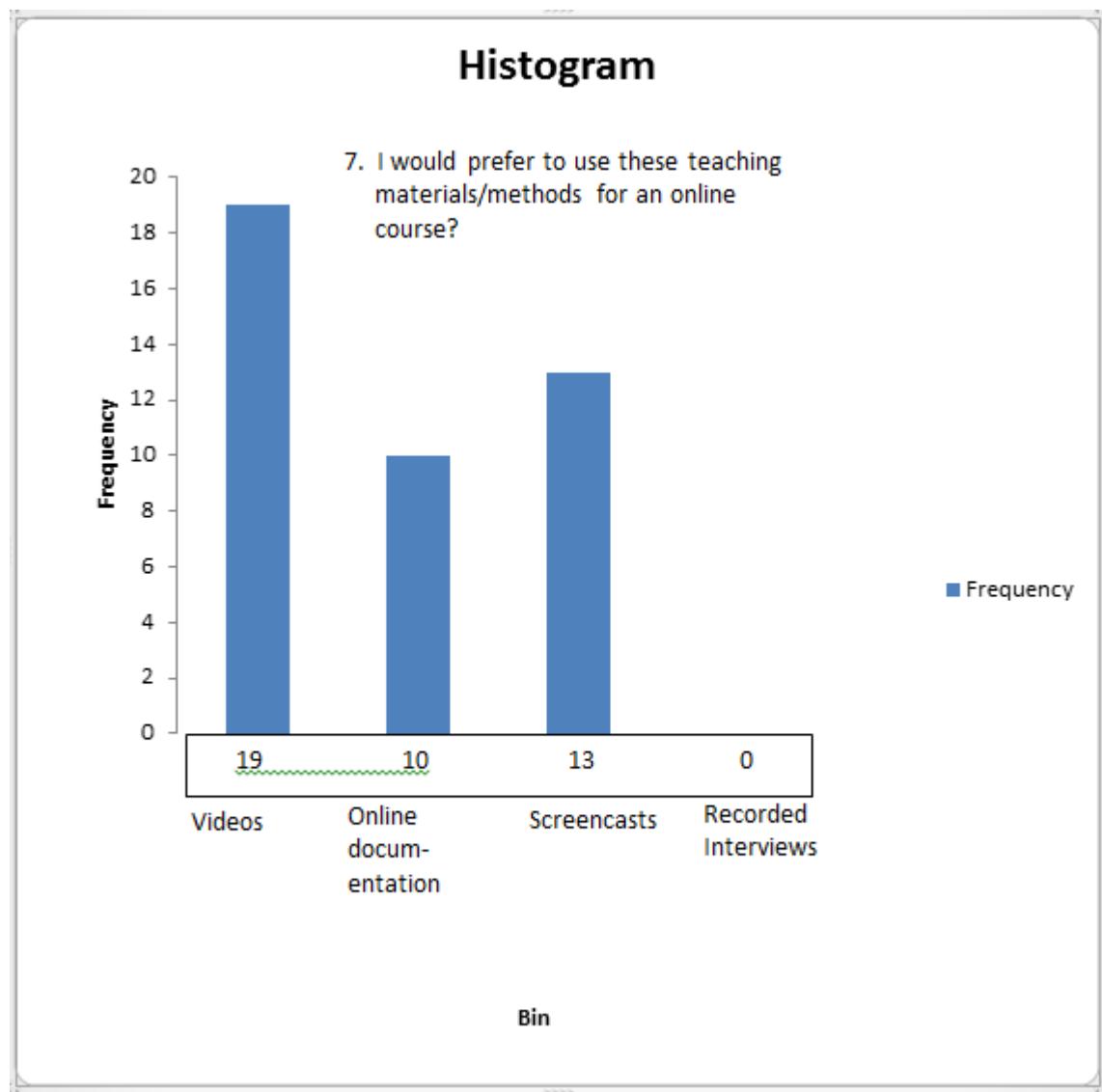


Figure 5-2 Histogram Question 7

Naturally this answer is in accordance with the practical work of the course where the participants work with hands-on assignments and tasks on software. No one would prefer recorded interviews which show that the respondents in this case value documentation that showcases practicality of the online course.

However, because of the format of the platform we used to launch the questionnaire this question was designed ordinarily so that the respondents could answer with different degrees of agreement.

As with the earlier question, this question on the topics they would like to follow online, was designed ordinarily so that the respondents could answer with different degrees of agreement.

So the respondents here could only choose the alternative they wanted the most to follow online.

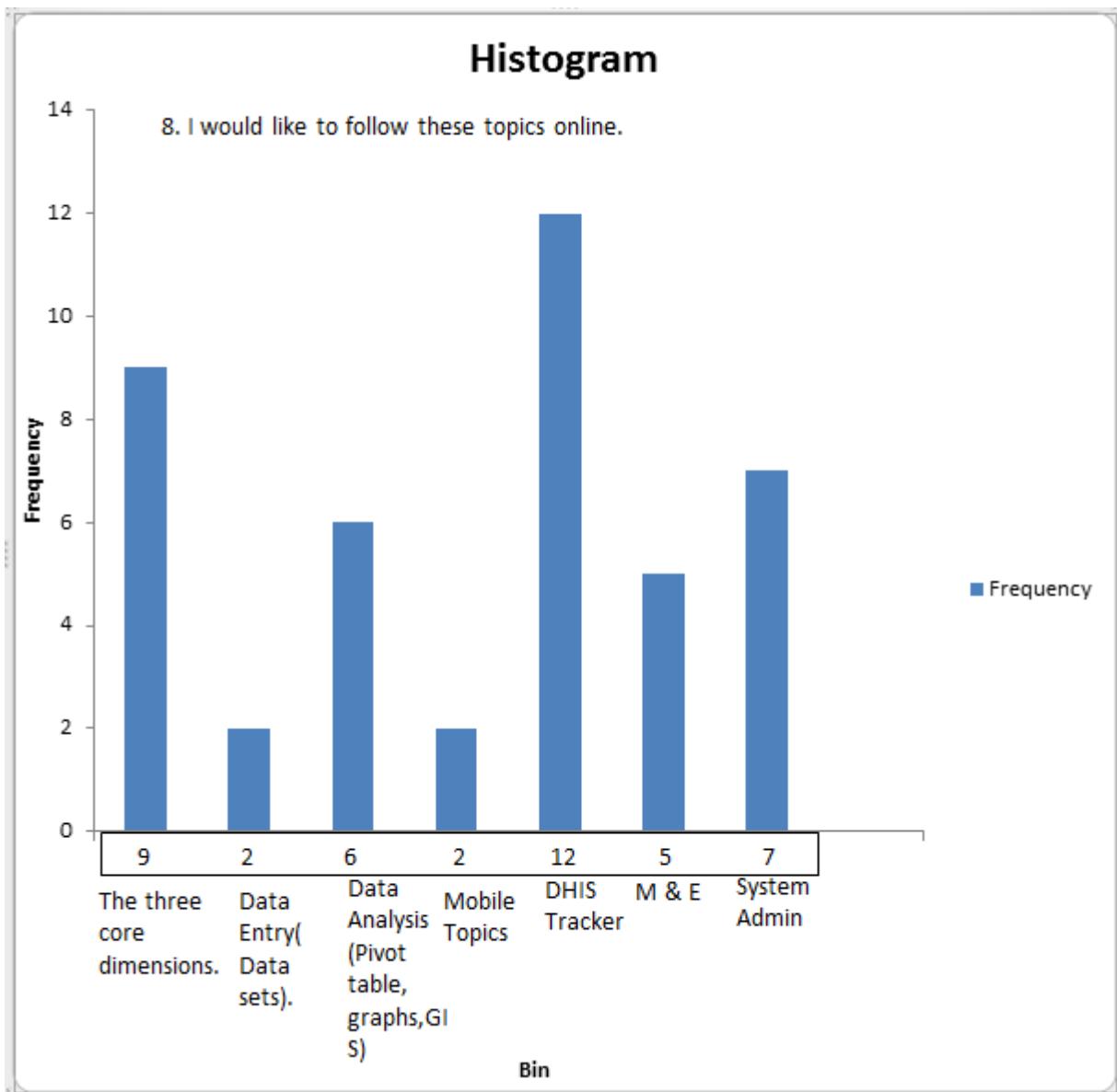


Figure 5-3 Histogram Question 8

The topic with the highest frequency was the DHIS tracker, see figure 5.2 above.

9 respondents would follow the 3 core dimensions, 7 respondents would follow the system admin topic. 6 respondents would follow the data analysis topics, 5 respondents would have liked to follow the M & E session.

A third of the respondents would have liked the most to follow the topic ‘DHIS tracker’ .

I observed that the DHIS tracker session was the shortest one that was introduced during the onsite course, and after speaking with some participants who explained that it was quite difficult as well.

This could perhaps be due to the fact that the DHIS tracker is based more and followed up more for the more advanced levels.

The respondents were asked which type of device they would prefer as this would give us a indication on the design aspect for the online course, for example if the majority answered mobile then a responsive design would be natural to attend to in the design phase.

36 respondents would prefer a laptop, while 5 respondents would prefer to use a mobile phone.

No one would prefer a tablet. This could probably be related to the practical aspect of the assignments and tasks, the onsite course consisted of a majority of work done on the software, which required a quite amount of input from the user. And this would not have been so efficient with a tablet.

The respondents were asked to select one or more of the alternatives of their motivation(s) for taking an online course.

I created a histogram with a display of the various combinations of alternatives chosen by the participants, see figure 5.4 in Appendix F.

The most popular combination of alternatives selected by the respondents was 'to improve my performance on my job', 'to gain knowledge' and 'to build a career'. Naturally whenever one takes an educational course, this could be valuable for his/her future career. It shows curiosity and the need for improving one's own skills and qualifications in a field. This could explain the outcome of the most popular combination.

5.2.1 Illustrative quotations

At the end of the survey, the participants were given the opportunity to write down any remarks/comments that they may have regarding an online course.

*“Easy search for the topics * Quality of materials (especially if its video & clear sound) * User friendly * Consideration of the bandwidth issues. * Attractive Well-designed certificate.”*

Here the respondent highlights the need for a simple user interface and learning material with high quality amongst others. These preferences are something that will be addressed during the work within the platform, especially since they are common preferences among all users.

“I think an online course would be ideal for continued education within DHIS. I would be enthusiastic to participate in monthly post-academy online course to build upon my skills and learn new methods/features. These courses do not have to be long, maybe just 2-3 hour sessions in the afternoon. This would also keep people engaged in the DHIS community”

This will not be attended too in this research, since it is out of this research scope. However follow-up learning program is still relevant in the portfolio of a future DHIS2 Online Academy.

“Materials for an online course should be made as simple and shorter as possible. The organizer should set recommendation alerts based on the demonstrated skills of the participant in a pre-test exercise.”

Recommendation alerts is not something that needs to be implemented at this stage, as the online course at this beginning is based on a fundamentals course. This means that there is no need for the separating the users as it is a general introduction to the software. However I designed a pre-survey for the online course, in order to get a sense on the level of the different skills the potential learners possess.

“Just make it very practical and focused on the how to do"question. Keep it concrete and step by step.”

“Make sure that you put on flow-charts (step by step description) of the procedures that people may easily understand things.”

These two statements address the wish to gain learning outcomes that will make them more proficient in performing the user functionalities in the software. The latter statement proposes a solution for targeting the practical aspect of the training program with the use of flow-charts.

“Live webinars on DHIS2 will be something I would recommend. In my opinion, you do not have to have face to face interaction to understand the workings of DHIS2, it is user friendly and for time management and better use of resource, the best thing that can happen is putting this online.

One participant also felt that the DHIS 2 Level 1 course was very much suitable for an online

course instead of as an onsite course. The participant points to the many advantages of conducting training online, such as time management and resource use.

To sum up, naturally simplicity, efficiency, quality and practically oriented instructions are highly appreciated in the presentation of a DHIS 2 online course.

Shown below is a table that summarizes and describes the most important findings in this phase.

Findings	Details/Description	Activity
Presentation of Material (Videos/Screencasts/Live Webinars)	Flowcharts were highly sought after during the practical sessions. And during the direct observation I had with some participants some participants further explained that this would help them remember the right steps and actions within the laboratory session.	The practical sessions
Post-Continued Education	An online course or seminar after the onsite Academy would be appreciated.	Follow-ups for the On-site Academy online.
Ease of Use	Important design feature, not to complex, simple search and navigation features in order to find the desired content was mentioned in the survey.	The whole interaction with the LMS.
Facilitator/Help online	This is more related to non-technical issues such as the pedagogical factor. Having the presence of a facilitator during the online course.	Online support for the online course

Table 5.2Data Summary

6 Action Planning: The Learning Platform; Open edX

In this chapter, there will first be a presentation of the chosen LMS and its defining architecture and features. In the following section, the interface of the LMS will be presented along with a description of the creation of the online course.

In the early stages of the research, a list with desired specifications for the LMS was developed, see table 6.1.

The table displays the needs and functionality requirements in order to create an overview over the ideal different elements the chosen LMS should attain to.

The Economist wrote in the summer of 2014 that there are three large learning platforms (see section 2.2.5) that have provided courses to over 12m students.

They report that under one-third of these students were Americans, however edX said during this time, that nearly half of its student came from developing countries.

Shown below is a chart which displays the demographics and statistics from edX of the academic year of 2012-2013.⁶

⁶ <http://www.economist.com/news/briefing/21605899-staid-higher-education-business-about-experience-welcome-earthquake-digital> Last Retrieved 23.11.2015

Scrolling for scrolls

Online MOOCs* provided by edX†

Student statistics, 2012-13 academic year

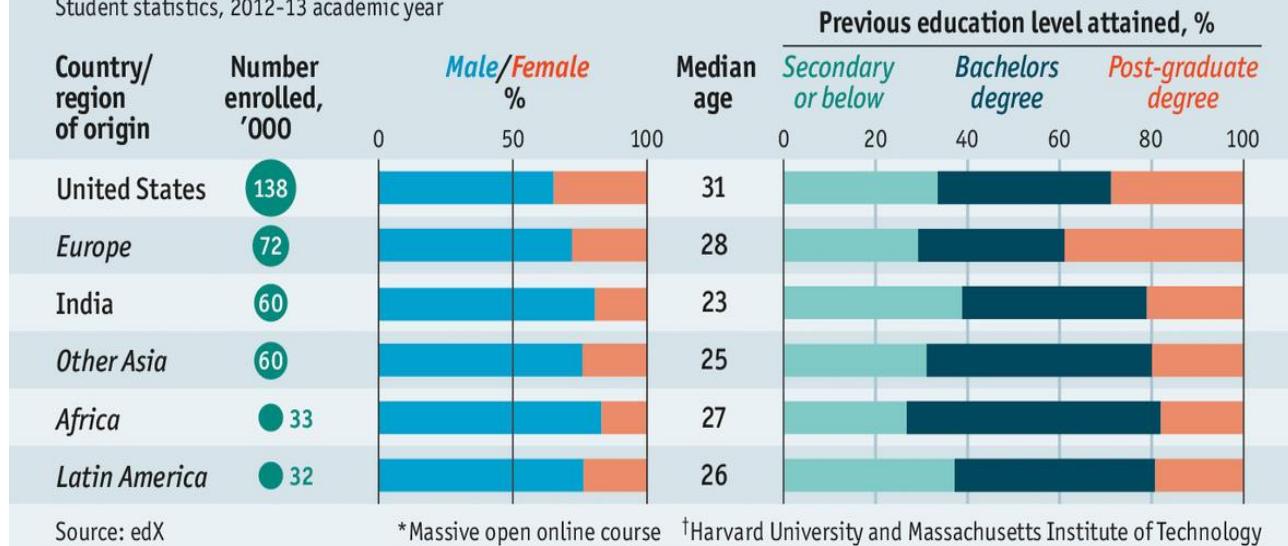


Figure 6-1 A visual display of the statistics behind online MOOCs provided by edX

6.1 DHIS 2 - Online Academy System Specifications

Potential size of learner's audience: Approximately 40/50 students for each course session.

Steps	Descriptions
<i>1. Needs Analysis</i>	<ul style="list-style-type: none"> 1. Skills and competencies management. 2. Create content-guided learning strategies for the users. 3. Create more tailored and specialized learning sessions through the LMS. 4. Create courses and sessions easily with inserted teaching material. 5. Automated Interface with DHIS 2 <ul style="list-style-type: none"> - Migrate data from DHIS 2 and link it to the learning platform 6. Be able to access it offline
<i>2. Requirements Definitions</i>	<ul style="list-style-type: none"> 1. Be able to access it offline 2. Collaborative Content-Development. <ul style="list-style-type: none"> -users can post and share documents/data that they have created. 3. Support an automated interface with DHIS 2 <ul style="list-style-type: none"> - Migrate data from DHIS 2 and link it to the learning platform 4. Generate feedback or online learning progress reports.
<i>3. Use Case Definitions</i>	<ul style="list-style-type: none"> 1. A participant that does assignments within the GIS app in DHIS has to generate a map, and this map has to be exported to the LMS. This map should be visible in the chosen LMS. 2. A participant has to be able to get a track record of his/her score on the assignments and be generated a feedback report based on the students' learning performance.

Table 6.1 Customized needs and specification list for Online Academy

This table was created by me in order to figure out which LMS was the most suitable for the organization, based on the examples of needs and requirements. Prior to the setup of the online course and selecting the platform which is to be introduced later on, we had meetings with the group for Digital Media and Learning (DML) from the university's IT-department. In these meetings there were discussions with their representatives regarding the various learning platforms such as Moodle, Canvas and Open edX.

These meetings were held because The University of Oslo was in the process of launching an online course based on Exphil the fall of 2014. It was named "Flexphil" and the course was designed as a MOOC.

The DML-group chose an LMS called Canvas for the launch of 'Flexphil'. It is an open-source LMS developed by a software company named Instructure Inc. In order to get an insight into how the DML group on behalf of the University chose their learning platform to deliver and distribute the course, I asked questions regarding the selection process on the selected LMS which was Canvas hosted through an open source solution provided by Bibsys. I also reviewed their documents on how they evaluated several MOOC platforms. Some of the included were FutureLearn, Canvas and edX.

The key factors for choosing the right LMS platform was:

- User-friendliness
- Compatibility to with other technologies
 - The ability to link with DHIS 2.

In light of the guidelines on selecting an LMS and interviews with DML that was earlier presented, we decided to implement Open edX as a learning platform, see table 6.3.

Guidelines	Open edX	Details
LMS must conform to the minimum definition of LMS	✓	
The LMS has been used within the country	✓	The University of Trondheim has in September 2015, launched a course by using Open edX.
The evaluation group had positive experiences with the LMS or heard positive comments about it from others	✓	
LMS supports multiple languages	✓	Open edX are hosting all translations of their framework on www.transifex.com
LMS integrates homogeneously the learning environment	✓	It also allows third-party integration(LTI)
LMS has basic documentation available	✓	All their documentation is provided online on edx.org/documentation
LMS is compliant with eLearning standards	✓	It is possible to add SCORM packages to Open edX via SCORM Cloud and LTI
The LMS organization has an active development with at least 2 full time developers (only for Open Source)	✓	The edX community have their own developer team, and they have various universities that have and are still providing functionalities to their platform.
LMS server runs on multiple operating systems	✓	It is possible to install it on Mac, Windows and Linux, however it is more feasible for Linux and Windows.

Table 6.2 Checklist of selected LMS based on guidelines by Mendoza et al, (2006)

DHIS 2 Needs/Requirements	Openedx	Details/Comments
Create courses and sessions easily with inserted teaching material.	✓	It provides a CMS where it is possible to create the desired structure for the course and upload material.
Generate feedback or online learning progress reports.	✓	It has a learning progress page. It also gives out automatic feedback and grading on the assignments that one can customize in the CMS.
Automated Interface with DHIS 2 - Migrate data from DHIS 2 and link it to the LMS.	✓ (Iframe-embeddable)	Not sure, this needs to be investigated further. It provides an LTI.
Be able to access it offline.	✗	No, but it has download features for videos and text material that is uploaded.
Collaborative Content-Development. -users can post and share documents/data that they have created	✓	Discussion forum allows for this type of content sharing.

Table 6.3 Checklist of selected LMS based on DHIS2 needs.

Mendoza et al, (2006) guidelines	Canvas	Futurelearn	Openedx	Details/Comments
LMS must conform to the minimum definition of LMS	✓	✓	✓	
The LMS has been used within the country	✓	✗	✓	However this excludes all the new LMSs from being tried at all.
The evaluation group had positive experiences with the LMS or heard positive comments about it from others	✓	✗	✓	Canvas: UiO is using it for Flexphil. Open edX: We had a meeting with a lecturer in economics from the Social Science Faculty. He had just started to begin working and developing a course for Open edX. Futurelearn: We were not able to find anyone who had used futurelearn.
LMS supports multiple languages	✓	Not investigated	✓	
LMS integrates homogeneously the learning environment	✓	✗	✓	
LMS has basic documentation available	✓	✓	✓	
LMS is compliant with eLearning standards	Not investigated	Not investigated	It is possible to add SCORM packages to Open edX via SCORM Cloud and LTI.	According to Adina (2007) eLearning standards refer to a system of common rules for content, authoring software and LMSs. They are rules that specify that courses can be created and delivered over several platforms so that they can operate seamlessly.
The LMS organization has an active development with at least 2 full time	✓	✓	✓	

developers (only for Open Source)				
LMS server runs on multiple operating systems	Not investigated	Not investigated	✓ It is possible to install it on Mac, Windows and Linux, however it is more feasible for Linux and Windows.	

Table 6.4 LMS Evaluation Table

6.2 The architecture and features behind Open edX

Open edX is an open source learning platform that powers courses on the LMS. The community behind it is a non-profit online initiative created by the funding partners Harvard and MIT and composed of dozens of leading global institutions. It is described by the community as a web-based platform for creating, delivering, and analyzing online courses.

In this chapter I will explain briefly the architecture behind the platform.

The information and the visual diagrams that are presented below are at a high level.

Students take courses using the LMS of Open edX. The courses are built of units called XBlocks.

An XBlock is described as edX's component architecture where course authors can combine components from a variety of sources. Courses are built hierarchically of XBlocks. They can represent pieces as small as a paragraph of text, a video, or a multiple-choice input field, or as large as a section, a chapter, or an entire course. They refer to this type of architecture with the example of an HTML(Hyper Text Markup Language) <div> tag, which is a coding technique that is used to divide the HTML document that every website is based on into sections.

The learning platform provides instructor dashboards; see the figure 6.1 of an instructor dashboard below. The instructor dashboard is for the course staff teachers, so that they may get an overview of the students' activity.

The screenshot shows the Instructor Dashboard for the course "HISP: DHIS2_Level1 DHIS 2 Fundamentals". At the top, there are tabs for Courseware, Course Info, Discussion, Wiki, DHIS 2 Implementation Guide, Progress, and Instructor (which is selected). Below the tabs, the title "Instructor Dashboard" is displayed. There are two buttons at the top right: "REVERT TO LEGACY DASHBOARD" and "VIEW COURSE IN STUDIO". A message box says "To gain insights into student enrollment and participation visit Your Platform Name Here Insights, our new course analytics product." Below this, there are tabs for COURSE INFO, MEMBERSHIP, STUDENT ADMIN, DATA DOWNLOAD, and ANALYTICS. Under "ENROLLMENT INFORMATION", it shows the number of enrollees by track: Verified (0), Audit (0), Honor (5), and a bolded Total (5). Under "BASIC COURSE INFORMATION", there is a list of course details: Organization: HISP, Course Number: DHIS2_Level1, Course Name: 2015_Q1, Course Display Name: DHIS 2 Fundamentals, Has the course started? Yes, Has the course ended? No, Grade Cutoffs: Pass: 0.7. Below this, a link says "View detailed Git import logs for this course by clicking here." Under "PENDING INSTRUCTOR TASKS", it says "No tasks currently running."

Figure 6-2Instructor Dashboard

Further the LMS consists of an XBlock runtime and provides user registration, progress tracking, grading and forums. A runtime is defined as the environment and data structures that keep track of everything that is going along as the LMS runs.

LMS

The LMS behind Open edX is explained as an LTI(Learning Tools Interoperability) tool consumer. An LTI is a specification that allows seamless connection of web-based, externally hosted applications and content, or Tools(such as chat to domains specific learning environments for complext subjects like Math or Science) to platforms to users.⁷

You can add an external learning application or textbooks to Studio by using an LTI component.

The data is stored as followed: course in Mongo, student data in MySQL and they are abstracted away by XBlocks.

⁷ <https://www.imsglobal.org/activity/learning-tools-interoperability> [last retrieved: 02.12.2015]

They can also generate reports for their courses as CSV (Comma Separated Values) files. From here they can also access the course analytics product, Insights.

The LMS uses a number of data stores. Courses are stored in Mongo which is a document database system, with videos served from YouTube or Amazon S3. Per-student data is stored in MySQL. Mongo is a document database system.

The engineers behind Open edX further explain that when the students move through courses and interact with them, events are published to the analytics pipeline for collection, analysis, and reporting. The LMS environment itself will be explained in greater detail in chapter 8.1.

Studio

The studio is described as the course authoring environment. This is where the course teams can create and update courses. See the figure below for a visual display of this component. The CMS studio will also be explained in a greater detail in subchapter chapter 8.1.

The screenshot shows the Studio interface for a course titled "HISP DHIS2_Level1 DHIS 2 Fundamentals". The top navigation bar includes "Content", "Settings", "Tools", "Help", and a user account. The main area is titled "Course Outline" and displays the following structure:

- Course Overview & Getting Started**
 - Released: Aug 10, 2015 at 01:00 UTC
- Welcome to DHIS 2 Fundamentals: Data collection**
 - Released: Aug 10, 2015 at 01:00 UTC
- Practical Information**
 - Released: Aug 10, 2015 at 01:00 UTC
- Now it's your turn**
 - Released: Aug 10, 2015 at 01:00 UTC

At the bottom of this section is a button labeled "+ New Subsection".

To the right of the outline, there are several informational boxes:

- Creating your course organization**: You add sections, subsections, and units directly in the outline.
- Reorganizing your course**: Create a section, then add subsections and units. Open a unit to add course components.
- Setting release dates and grading policies**: Select the Configure icon for a section or subsection to set its release date. When you configure a subsection, you can also set the grading policy and due date.
- Changing the content students see**: To publish draft content, select the Publish icon for a section, subsection, or unit.
- Hiding content from students**: To hide content from students, select the Configure icon for a section, subsection, or unit, then select "Hide from students".

At the bottom right is a link "Learn more about the course outline".

Figure 6-3 Studio Interface

The interface consists of a simple front page for browsing courses, with a short course description included in each course image.

There is a mobile application, available for iOS and Android, where students can watch course videos. They are actively enhancing the mobile app.

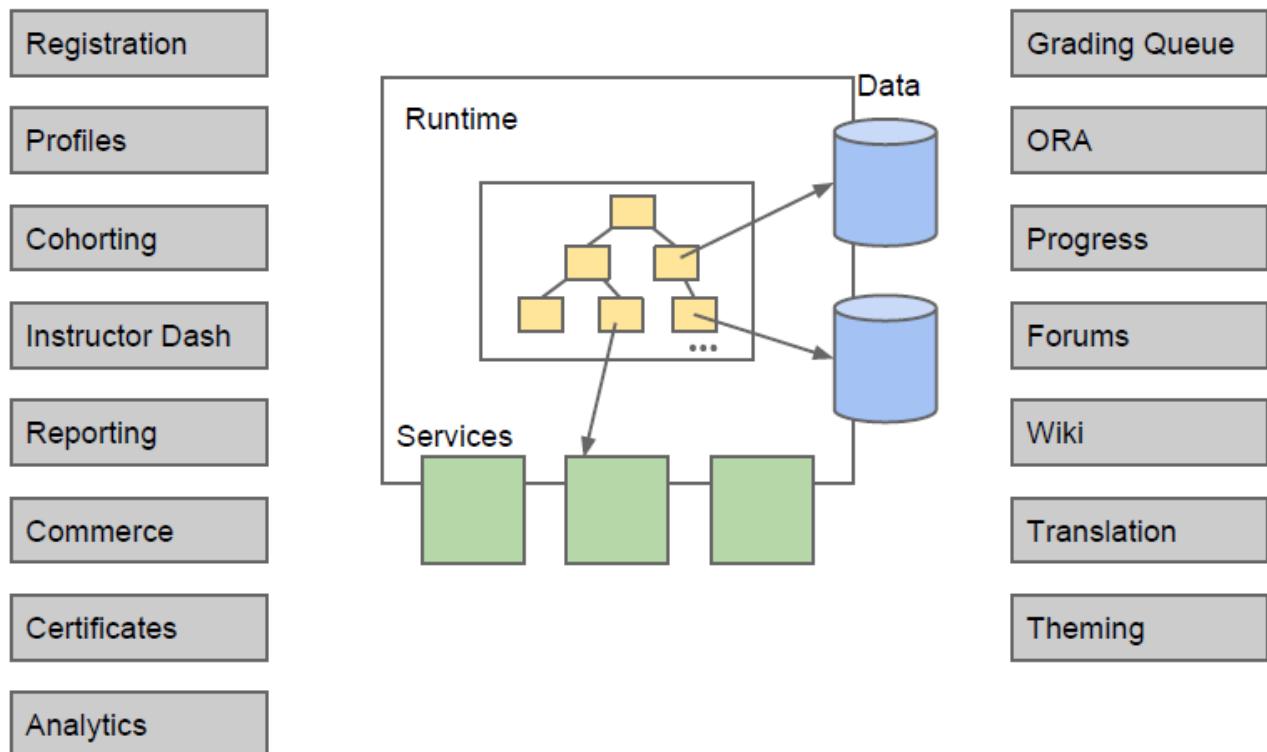


Figure 6-4 An illustrative model of the LMS

The results are made available via a *REST*(Representational State Transfer) *API* (Application Programming Interface) to *Insights*, which is a Django application that instructors and administrators can use to explore data that lets them know what their students are doing and how their courses are being used. REST is an architecture style for designing networked applications. *Insights* is a course analytics product made by edX. The data from this tool is meant to help course teams monitor activity, validate choices, and reveal unexpected patterns amongst other.

7 Action Taking: Content Creation and Online Course Design

In this chapter there will first be a presentation of the post-production work of some of the content making in forms of screencasts. Later it will be a presentation of some of the elements of the online course design that has been created.

As mentioned earlier, the project team for the online course consisted of me and the Community Manager for the DHIS 2 Academy, later in the research project we were joined by a PhD-graduate within the research group.

She helped us with the written translation of the screencast audio and evaluating the screencasts that was created as well.

We followed the documents provided by the edX community on how to create an edX course in the CMS studio. As mentioned earlier, the Open edX software contains two main applications; the LMS is for taking the courses and the CMS which is the ‘Studio’ for creating the courses.

A process of how the online course came into creation will be explained, accompanied with the related screenshots of the interface. During this part, I will also explain the chosen interactive design features that were implemented in the CMS.

In the second half of this chapter, the CMS studio authoring environment will be presented and explained. Here I will describe the various functionalities and components that was implemented, thus to show how the creation of part of the online course was created on the back end of the system.

7.1 Content Creation

Based on the results from the survey, see section 5.2, the majority of the participants preferred screencasts and videos instead of online documentation as teaching methods.

In this section I will present and discuss the post-production part of the screencasts that were made. Creating and evaluating the screencasts and the content was the most challenging part.

Since I was the one behind the screencast production, the evaluation was conducted by the PhD candidate who joined the team at a later stage of the project.

8 screencasts were recorded from the trainers on a provided computer.

In the post-production part, the videos where edited with Camtasia Studio, which is a software tool

for creating screencasts and other instructional materials.

7.1.1 Applied Software

During the field trip, I collected screencasts from the trainers and recorded them on the computer.

For this task, Camtasia Studio was the software that was used. It is a software tool by Techsmith (Software Company for developing screen casting tools for Microsoft Windows and Mac OS). The tool is used for screen recording and video editing. It is regarded as a full-featured education/Information video tool. It shows how to capture and show screen-based activity, such as cursor movement/options, menu choices, and other interface interactions.

7.1.2 Prototype: Video Material

The screencasts that were captured during the field study consisted of: data elements, data sets, data visualizer, access control and user management and organization units.

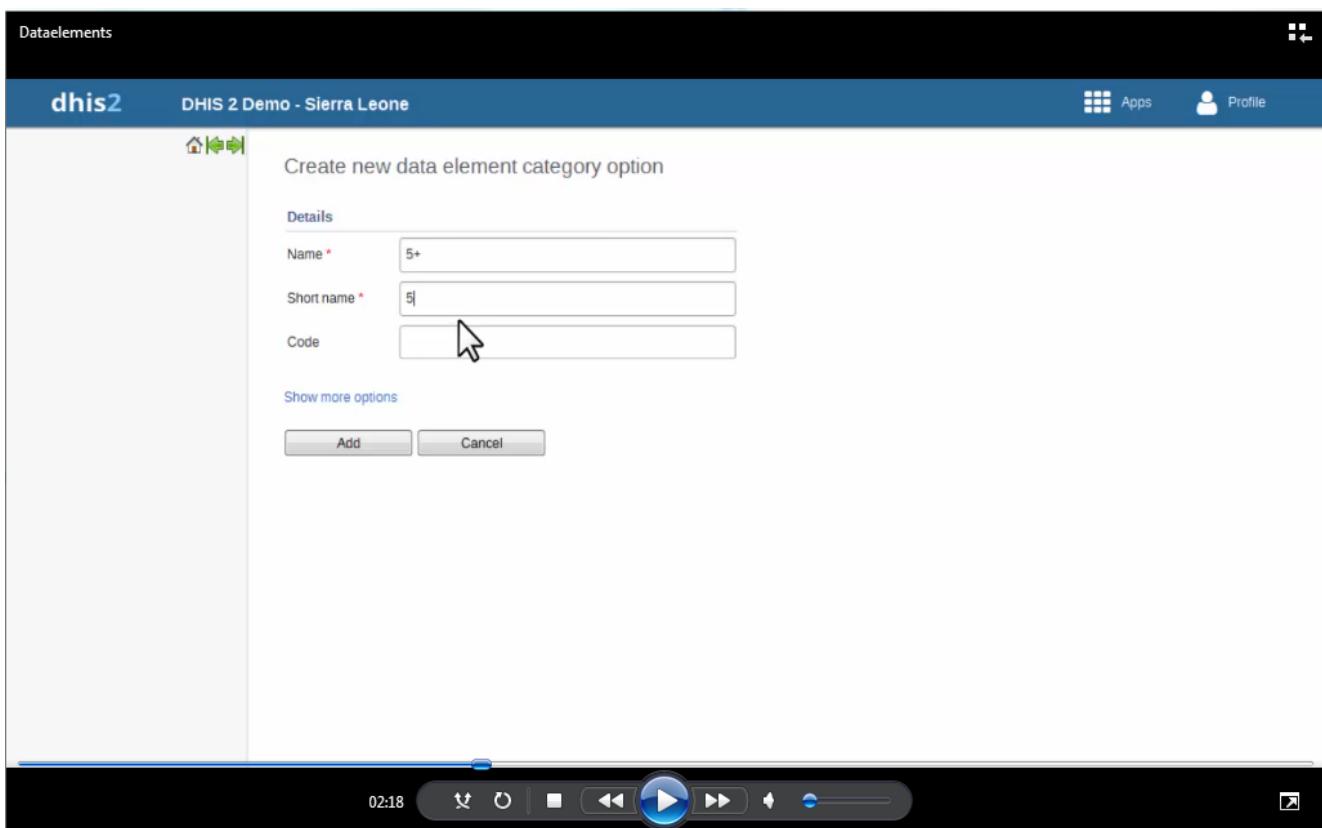


Figure 7-1Data Elements Screencast

Shown above is the Data Elements screencast where the duration is about 6 minutes and 30 seconds. In this video we explain to the user with the use of an excel-based data collection tool with the example of a Malaria Monthly Reporting Form. Further we demonstrate how to create data element category options. Data element category options are atomic elements that are grouped into categories. One example is the following:

Male/<5 years

Female />5 years

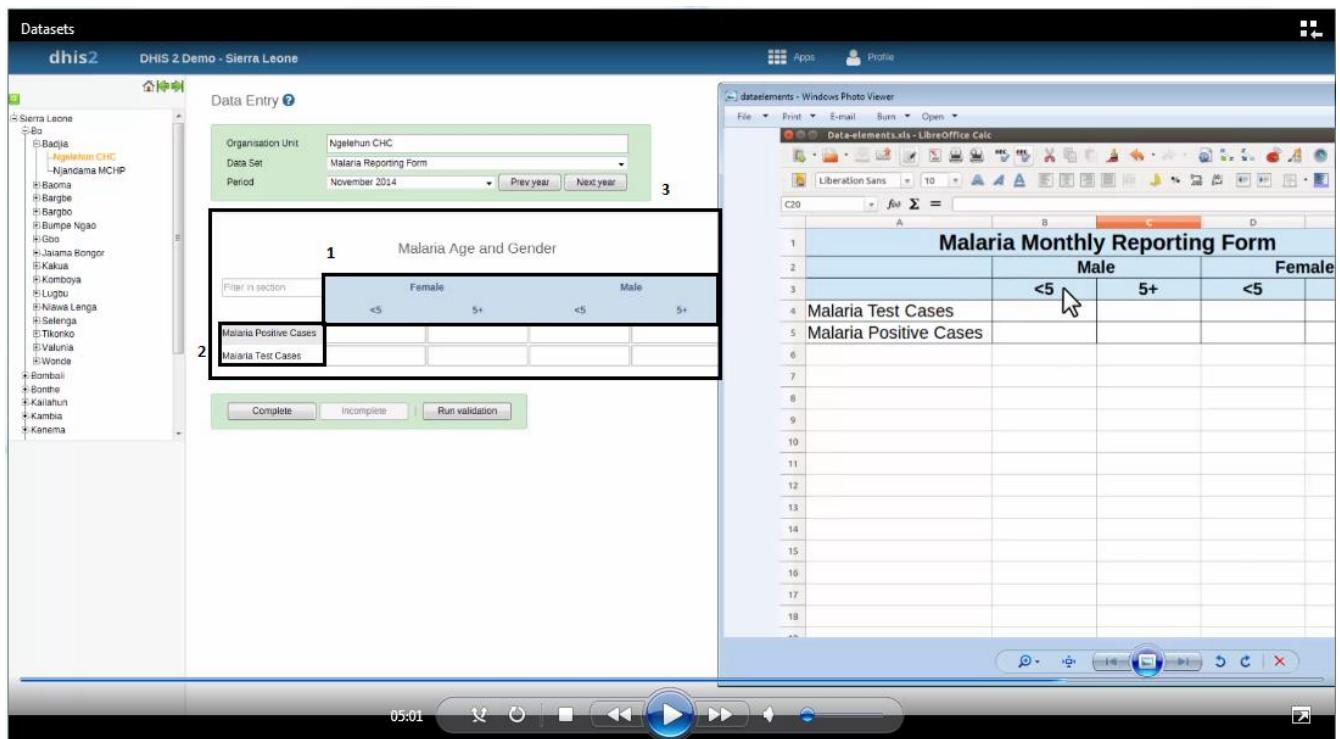


Figure 7-2Data Sets Screencast

The figure above displays the screencast that is about Data Sets. In the beginning of the video we made a small recap of the earlier screencast which is about Data Elements, in order to remind the user of our actions and how this is tied up to the creation of a Data Set. A data set is composed of data elements and indicators. Step 1 displays the data element category combinations that are defined, step 2 defines the options, while step 3 covers the whole dataset.

In the following scene in the screencast we demonstrate how to assign Data Sets to Organization Units, in order to show the relation on these changes now; we also show the user how the Data Set looks at this stage on the Data Entry Level.

This is done in the Data Entry Module in the ‘apps’ section. In this step we display the result of the previous screencast and this screencast as the same Excel-based reporting form in DHIS 2, see figure 7.2.

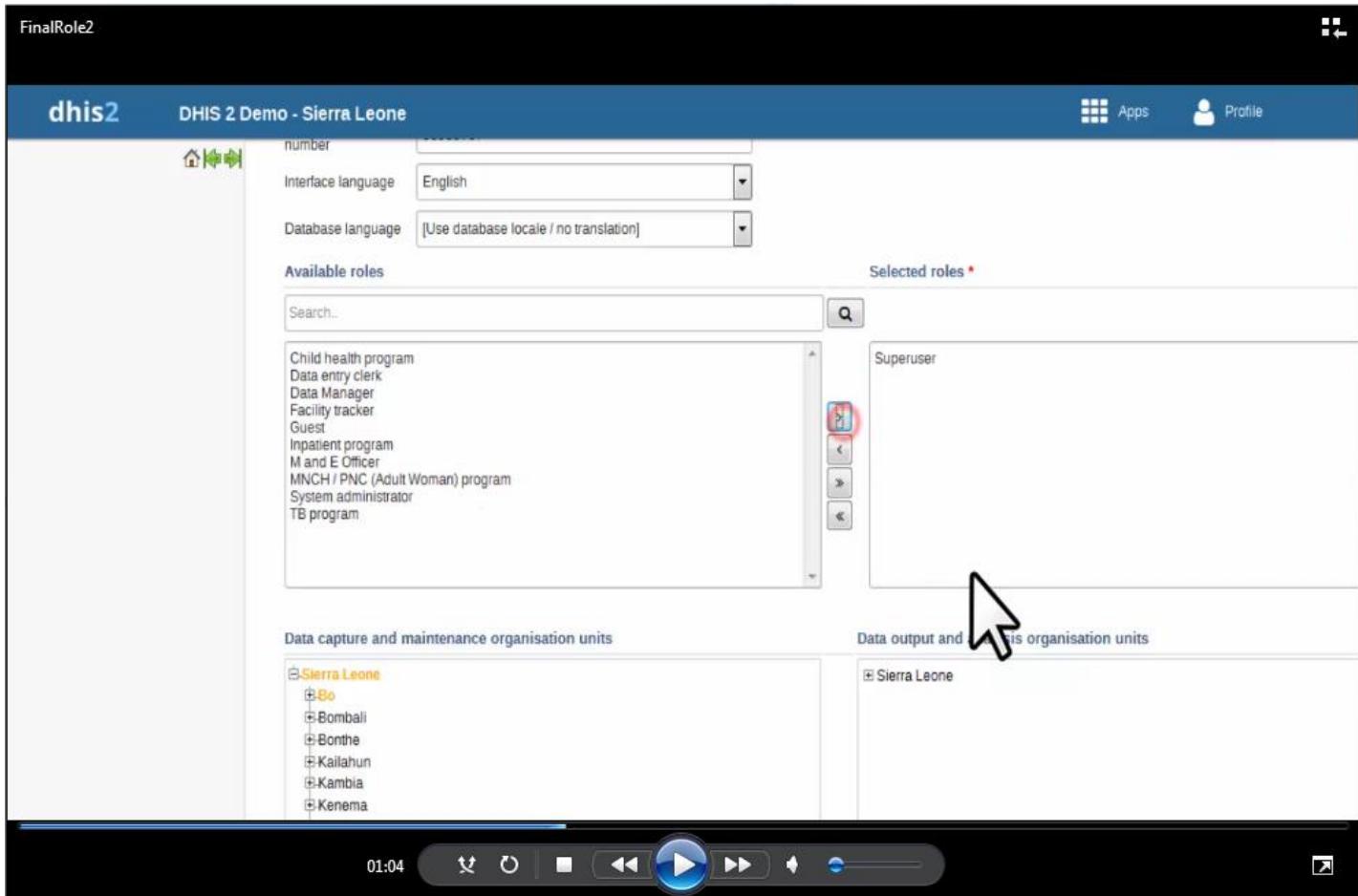


Figure 7-3 User Roles and User Management Front-Page Screencast

Shown above is the screencast front-page for User Roles. The original length was approximately 8 minutes, after the editing of the material; we broke it down in 3 videos with duration for 1 minute and 45 seconds, 2 minutes for the second screencast and 1 minute and 37 seconds in the last screencast. In the first screencast the trainer explains the systematic overview behind the user roles and user management within the system by speaking of the various terms related to it.

Shown below is an example of the content each screencast could consist of.

Video 1- This will be a video based on the introduction where the topic to be explained is the DHIS 2 Fundamentals in regards to the data collections.

Video 2- In this video there would be a brief explanation of a paper form that describes a peripheral health unit monthly summary of reproductive health services. There will also be a talk about the information cycle and the advantages of the software in this context.

Video 3- Will contain an analysis of the form so that it can be implemented into DHIS 2.

Video 4- In this video we explain to learner the concept of an organizational hierarchy of standards, by referring to the form. The hierarchy of standards is a pyramid structure which illustrates the standard data, data sets and indicators for each level.

Video 5- Data Elements

Video 6- Data Sets

Video 7- In this video there will be a summary of the learning objectives of the videos and a recap of the topics that has been presented in the previous videos.

The flowcharts shown below describe examples of how they may be designed. The flow charts illustrate the several steps the user must perform in the software in order to create a user role. They were created in MS Visual Basic.

Flow Chart: User-Roles and User-Role Management

Create new users and manage their roles

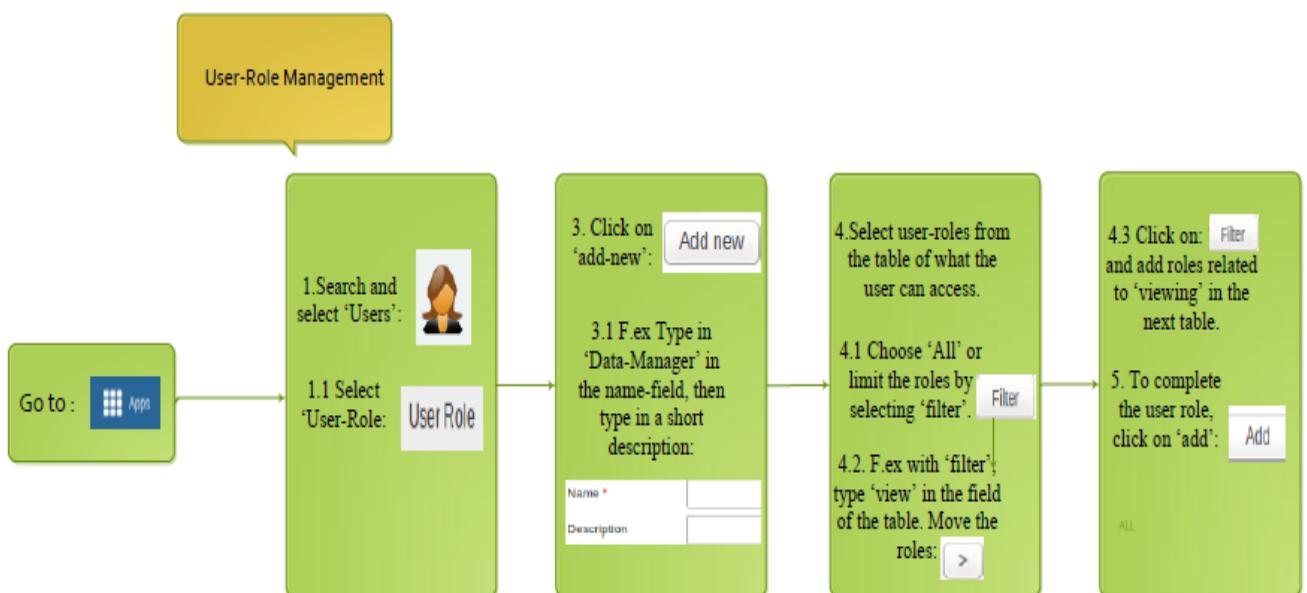
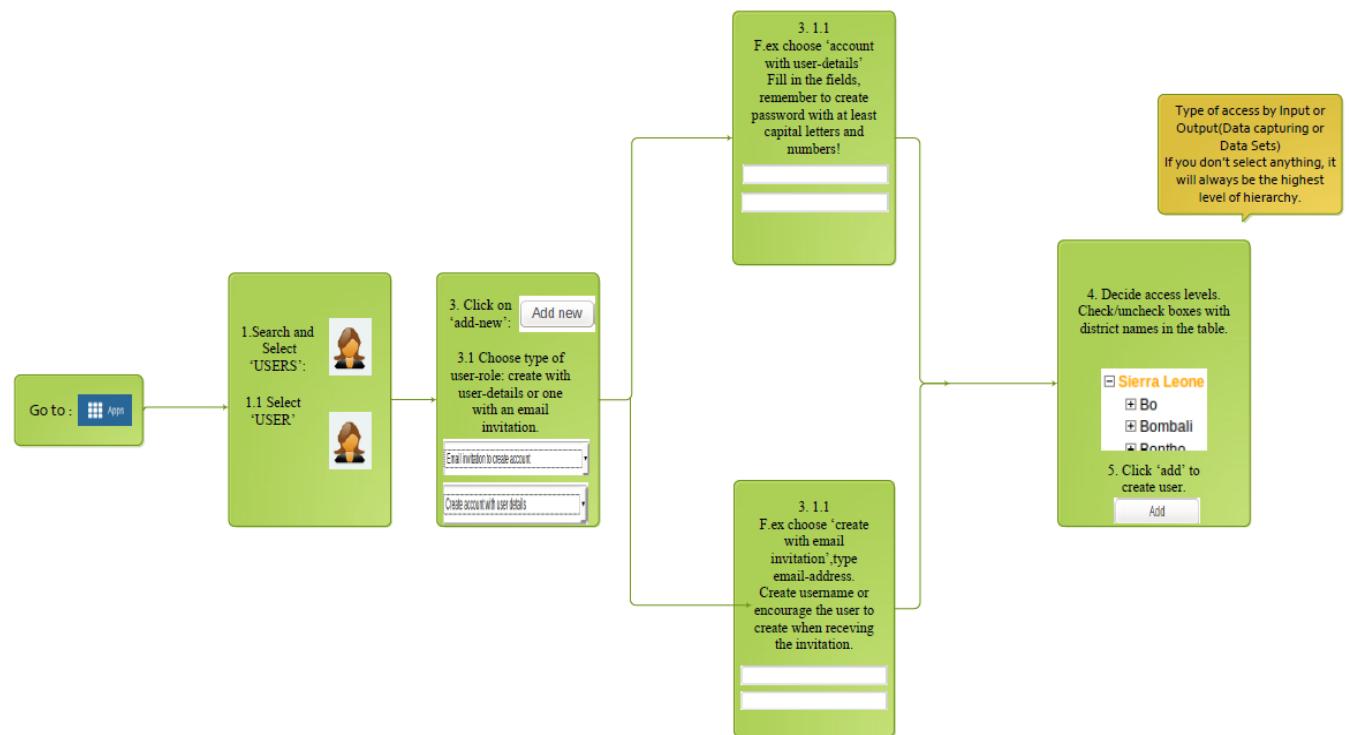


Figure 7-4 Flow Chart Design Examples

7.2 The LMS Interface

The screenshot shows a web-based Learning Management System (LMS) interface. At the top, there is a header bar with a user icon, the course title "HISP: DHIS2_Level1 DHIS 2 Fundamentals", and a navigation bar with links for "Courseware", "Course Info" (which is selected), "Discussion", "Wiki", "DHIS 2 Implementation Guide", "Progress", and "Instructor". Below the header, there is a "View this course as:" dropdown set to "Staff". The main content area is titled "Course Updates & News". It contains two entries: one from "AUGUST 18, 2015" stating "This week is to demo to Edwin", and another from "MAY 5, 2015" titled "Welcome to DHIS 2 Fundamentals!". This second entry includes a welcome message, information about navigating the platform, a pre-course survey, and encouraging learners to introduce themselves in the discussion forum. To the right of the main content area, there is a sidebar titled "Course Handouts".

Figure 7-5The LMS Interface(Course updates and News)

Shown above, is the course information page of the site. We provided a welcoming text for the learners, where we encourage them to introduce themselves in the discussion forum and also to take a pre-course survey which we have designed for them. We also inform them of the download-feature for those with poor internet connection.

Courseware Course Info Discussion Wiki DHIS 2 Implementation Guide Progress Instructor

Course Overview & Getting Started

Welcome to DHIS 2 Fundamentals: Data collection

Practical Information

Now it's your turn

Session 1 - From paper forms to datasets

Section 2 - Context of the form

Session 3 - Analyses of the form

Session 4 - Organisational hierarchy

Section 5 - Data elements

Section 6 - Creation of the form

Section 7 - Wrapping up

VIEW UNIT IN STUDIO

GHANA GHSDHIMS.ORG - AN AFDB 2013 AWARD WINNER ON EHEALTH!

Let's watch this video of a real use case of DHIS 2 implementation. Since April 2012, Ghana has been using DHIS 2 nation-wide with a fully online deployment led by the Ghana Health Service. In 2013, this DHIS 2 implementation won the The African Development Bank eHealth competition. In this video, produced by NORAD, Anthony Ofusu and Denis Adaletey from Ghana Health Service and Professors Jørn Braa and Kristin Braa from University of Oslo are telling you about DHIS 2 and its adoption in Ghana.

STAFF DEBUG INFO

VIDEO - SESSION 0 - GHANA USES DHIS 2

0:00 / 0:00 SPEED 1.0x CC

Figure 7-6Courseware Front-Page

This is the courseware front page for the online course. The courseware section is where the learners will spend most of their time. The learner can click on the tabs [Course Info, discussion, wiki, DHIS 2 Implementation Guide, progress and Instructor] next to the 'courseware' title text. The edX model for online courses is to use learning sequences in the design of an online course. A set of interactive learning exercises have been implemented, these exercises allow the learner to get immediate feedback on their progress through the material. All of these exercises are auto-graded on the edX platform.

The edX community state that studies have shown that rapid feedback has significant and positive effect on learner performance when compared to no rapid feedback. They further explain that there is also a way to tailor the amount and frequency of the information that is provided to the learners on several different levels. At the most basic level, the learners receive immediate information on whether they answered an exercise correctly.

In the guidelines, the edX community encourage us to create a high number of attempts, in order to allow the learners to address their misconceptions.

After the learner has viewed a video, a simple short exercise is provided for the learner to solve.

This is referred to as finger exercises that are intended to help student stay engaged.

According to edX this will promote active engagement as the student checks their understanding of the material. This is a concept which has been borrowed from the Socratic Method.

It is a teaching technique in order to foster critical thinking.⁸

The designed course is at this stage divided into 7 sections, and in each section learners will study a couple of learning sequences, some simple interactive exercises along with selected designated assignments.

The screenshot shows the edX Courseware interface. At the top, there is a navigation bar with tabs: Courseware (which is selected), Course Info, Discussion, Wiki, DHIS 2 Implementation Guide, Progress, and Instructor. Below the navigation bar, there is a sidebar on the left containing a tree view of course content. The tree includes nodes for 'Course Overview & Getting Started', 'Welcome to DHIS 2 Fundamentals: Data collection', 'Practical Information' (which is expanded), and 'Now it's your turn'. Under 'Practical Information', there are links to 'Session 1 - From paper forms to datasets', 'Section 2 - Context of the form', 'Session 3 - Analyses of the form', 'Session 4 - Organisational hierarchy', 'Section 5 - Data elements', 'Section 6 - Creation of the form', and 'Section 7 - Wrapping up'. To the right of the sidebar, there is a main content area. At the top of the content area, there is a large horizontal slider with arrows for navigating between sections. Below the slider, there is a button labeled 'VIEW UNIT IN STUDIO'. The main content area has a title 'Course Information' and a section titled 'COURSE OUTLINE'. The text in 'COURSE OUTLINE' states: 'Each topic is presented in the form of a video of approximately 5 minutes in length. Watch them at your leisure, download them to save them for later, participate in the discussions, and see how much you've learned by taking the assignments afterwards. The estimated time for completing this course is approximately 8 hours. Of course, you're welcome to discuss each session as long as you'd like!'. Below 'COURSE OUTLINE' is a section titled 'GRADING POLICY'. The text in 'GRADING POLICY' states: 'The core philosophy of this course is 'learning by doing' as well as 'learning by participating.' Therefore, what is valued most and graded accordingly, is the effort you put in and the experiences you have. This will be graded based on completion of the assignments as well as participation in discussion forums whereby quality is more important than quantity. This means we especially encourage engaging with the wider DHIS2 community on forums and reflecting upon learnings in relation to use cases that are personally meaningful.' Below 'GRADING POLICY' is a section titled 'TIMELINE'. The text in 'TIMELINE' states: 'You have until the June 1st to complete all the material.' Below 'TIMELINE' is a section titled 'GRADES'. The text in 'GRADES' states: 'Grades are broken down as follows:'. Below 'GRADES' is a note: 'The pass grade for the overall course is 70 %'. At the bottom of the content area, there is a URL: 'HISP/DHIS2_Level1/2015_Q1/courseware/01af4a5d27034c53b7f6a1ccb4e1a054/52b2ca49ea0d46a699460f4f1494c190/#'.

⁸ http://files.edx.org/Overview_of_Creating_an_Online_Course-V1.pdf

In this part we outline the course information, and describe the guidelines that we have set for the grading policy, timeline, exam, assignments and the expectations for participants activity in the discussion forums especially. The course exam pass grade is 70 % and it is broken down as follows:

- * 10 % for participation in discussions (minimum 2 contributions)
- * 50 % for the assignments
- * 40 % for the final exam.

Since this is a designed as a quite practical and active course, the core philosophy of the course is described as 'learning by doing' as well as 'learning by participating'.

We encourage the learners to engage with the DHIS 2 community on the forums, as this will help in promoting a better learning and sharing experience overall.

In the 'practical information'- segment, we have defined the discussion forum guidelines.

Here we lay out the ground rules for the learners behaviour, and we also inform them of the interactive functional aspects regarding how to the use of discussion forum.

The screenshot shows the DHIS2 Online Academy's pre-course survey interface. At the top, there is a navigation bar with tabs: Courseware (which is selected), Course Info, Discussion, Wiki, DHIS 2 Implementation Guide, Progress, and Instructor. Below the navigation bar, there is a sidebar on the left containing a list of sections: Course Overview & Getting Started, Welcome to DHIS 2 Fundamentals: Data collection, Practical Information (with a sub-section 'Now it's your turn'), Session 1 - From paper forms to datasets, Section 2 - Context of the form, Session 3 - Analyses of the form, Session 4 - Organisational hierarchy, Section 5 - Data elements, Session 6 - Creation of the form, and Section 7 - Wrapping up. The main content area is titled 'PRE-COURSE SURVEY' and contains the following text: 'Please take a minute to complete this pre-course survey when you start our online course. Your careful response will have a real impact on how courses like this are run. Thank you!'. Below this text, there is a section titled 'Pre-Course Survey HISP DHIS2 Online Academy' with a note '*Må fyllles ut'. It asks 'People register for online courses for different reasons. Which of the following best describes you? *' with four radio button options: 'Here to browse the materials, but not planning on completing any course activities (watching videos, reading text, answering problems, etc.)', 'Planning on completing some course activities, but not planning on earning a certificate.', 'Planning on completing enough course activities to earn a certificate.', and 'Have not decided whether I will complete any course activities.'. There is also a dropdown menu for 'In which country do you reside? *'. Below that, there is a question 'Are you, or have you ever, taught material related to this course? *' with three radio button options: 'Yes', 'No', and 'Unsure'. At the bottom right of the main content area, there is a 'STAFF DEBUG INFO' button. The footer of the page displays the URL: 'IS2_Level1/2015_O1/courseware/01af4a5d27034c53b7f6a1ccb4e1a054/29764e5e36414817bcacf8085da6c112/'.

Figure 7-8Practical Information Interface (Pre-Course Survey)

In order to find out the learners' background, technical skill sets, their motives and more for taking this online course, we have designed a pre-course survey. In this survey we ask them which of the following elements they intend to complete during the course, how many hours they plan on spending, and also how much they know of the DHIS from before.

I designed the survey by using a Google Form which I then embedded into the CMS as an *iframe*. This method will be elaborated a bit further in a later sub-chapter. As mentioned earlier, we highly encourage the learners to participate actively in the course, therefore the learners gets a point for introducing him/herself in the forums.

Introduction of the paper form

Assignment - Paper Form
Short Assignment due Aug 31, 2015 at 00:30 UTC

Context of the paper form

Assignments - Context of the paper form
Short Assignment due Aug 31, 2015 at 00:30 UTC

- ▶ [Section 2 - Context of the form](#)
- ▶ [Session 3 - Analyses of the form](#)
- ▶ [Session 4 - Organisational hierarchy](#)
- ▶ [Section 5 - Data elements](#)
- ▶ [Section 6 - Creation of the form](#)
- ▶ [Section 7 - Wrapping up](#)

ASSIGNMENT - SESSION 1 - PAPER FORM (1 point possible)

Please click with the cursor of your mouse in the area within the image that displays the dataset you will learn to build during this course.

ANC (refer to tally sheet PHUF1)		DELIVERY (refer to tally sheet PHUF4)	
PHU	OUT-PATIENTS	PHU	community
1st ANC visit	MCH Adm	U/Birth	S/Birth
2nd ANC visit	SECHN		
3rd ANC visit	Midwives		
4th or more ANC visits	CHO		
L/LT N given at ANC	Trained TBA		
Iron/Pulse given at ANC	Untrained TBA		
L/LT N given at ANC	Complicated Deliveries		
1st IPT dose given by TBA	Low Birth Weight		
2nd IPT dose given at PHU	L/LT given after delivery		
2nd IPT dose given by TBA			
POST-NATAL CARE (PHUF5)			
		PHU	OUT-PATIENTS
		1st Contact (within 1wk)	
		2nd contact (at 6wks)	
		Vitamin A given at birth	
TT for Pregnant Women (PHUF6)		TT for Non-Pregnant Women (PHUF7)	
TT1	TT1	TT2	TT2
TT2		TT3	
TT3		TT4	
TT4		TT5	
TT5			
COMPLICATIONS OF EARLY PREGNANCY (refer to tally sheet PHUF8)			
Complication		Managed at PHU	Referred
Malaria in 1st trimester (treat with oral quinine)			
Malaria in 2nd or 3rd trimester (treat with ACT)			
Anaemia			
Hypertension			
Abortion			
STI			
Other (hyperemesis, UTI, etc.)			
COMPLICATIONS OF LATE PREGNANCY (>22 WKS) AND LABOUR (refer to tally sheet PHUF9)			
Complication		Managed at PHU	Referred
Pre-eclampsia/Eclampsia/Hypertension			
Ante-partum haemorrhage			
Obstructed labour			
Post-partum sepsis			
Post-partum hemorrhage			
Retained Placenta			
Major iatrogenic			
Other maternal complications (anaemia, etc.)			
FAMILY PLANNING SERVICES (refer to tally sheet PHUF10)			
METHOD	Number of clients		
	Newclients	Continuing clients	
Oral contraceptive pills			
Male Condom			
Female Condom			
IUD			
Injectables			
Implants			
Spermicide			

Check
Reset
Save
Show Answer
You have used 0 of 2 submissions

SUBMISSION HISTORY
STAFF DEBUG INFO

Figure 7-9 Example of the Assignment (Paper Forms to Datasets)

We start this section which is named 'From paper forms to dataset's with a video explaining how the paper form is designed and what the various tables mean. In the next segment we designed an assignment where the learner need to address which datasets in the illustrative paper form shown above, that he/she will learn to build during the course. In order for the learner to respond, some basic 'click and drop' functionality has been applied. The learner can 'save' the answer or 'check' if the answer is right or wrong. Once the learner submits the right answer, a green tick box appears, and the correct area is highlighted in red as well. See figure 7.10

In addition after the learner saves the answer, an explanation box is displayed where more detailed information of the answer is provided. See figure 7.11

ASSIGNMENT - SESSION 1 - PAPER FORM (1/1 point)

Please click with the cursor of your mouse in the area within the image that displays the dataset you will learn to build during this course.

MINISTRY OF HEALTH AND SANITATION PHU MONTHLY SUMMARY OF REPRODUCTIVE HEALTH SERVICES - PHUF3										
District:.....	Name of PHU:.....	Chiefdom:.....								
Reporting Officer:.....	Signature:.....			Month:.....	Year:.....					
ANC (refer to tally sheets PHUT2)			DELIVERY (refer to tally sheets PHUT4)							
	FIXED	OUT-REACH	Deliveries assisted by	In PHU		In community				
1st ANC visit			MCH Aides	U/Birth	S/Birth	U/Birth	S/Birth			
2nd ANC visit			SECHN							
3rd ANC visit			Midwives							
4th or more ANC visits			CHO							
LLITN given at ANC			Trained TBA							
Iron Folate given at ANC			Untrained TBA							
Albendazole given at ANC			Complicated Deliveries							
1st IPT dose given at PHU			Low Birth Weight							
2nd IPT dose given at PHU			LLITN given after delivery							
2nd IPT dose given by TBA			POST-NATAL CARE (PHUT5)							
			FIXED	OUT-REACH						
			1st Contact (within 1wk)							
			2nd contact (at 6wks)							
			Vitamin A given at postnatal							
TT for Pregnant Women (PHUT6)			TT for Non-Pregnant Women (PHUT6)				In Sub (PHUT5)			
TT1			TT1							
TT2			TT2							
TT3			TT3							
TT4			TT4							
TT5			TT5							
COMPLICATIONS OF EARLY PREGNANCY (refer to tally sheets PHUT6)										
Complication			Managed at PHU	Referred	Deceased in PHU	Deceased in Community				
Malaria in 1st trimester (treat with oral quinine)										
Malaria in 2nd or 3rd trimester (treat with ACT)										
Anaemia										
Hypertension										
Abortion										
STI										
Other (hyperemesis, UTI, etc)										
COMPLICATIONS OF LATE PREGNANCY (>22 WKS) AND LABOUR (refer to tally sheets PHUT6)										
Complication			Managed at PHU	Referred	Deceased in PHU	Deceased in Community				
Pre-eclampsia/Eclampsia/Hypertension										
Ante-partum hemorrhage										
Obstructed labour										
Post-partum sepsis										
Post-partum hemorrhage										
Retained Placenta										
Malpresentation										
Other maternal complications (anaemia, etc...)										
FAMILY PLANNING SERVICES (refer to tally sheets PHUT6)										
METH OD			Number of clients							
			Newclients	Continuing clients						
Oral contraceptive pills										
Male Condoms										
Female Condoms										
IUD										
Injectables										
Implants										
Spermicide										



Figure 7-10Part 1/2 of Assignment Session 1(Paperforms to Datasets)

EXPLANATION

The upper section of the form and the section below on the left that displays antenatal consultations will be used to teach students how to build a simple data set for this course.

The upper section gives information on the type of form

The ANC table

This table in the top left corner is one of the simpler ones in this form. It has two dimensions, the first column with the ANC activity or service (1st visit, IPT 2nd dose etc) and the second and third column which represent the place where the service was given with the two options "Fixed" and "Outreach". Since the ANC service is the key phenomena to analyse here, and often there is a need for looking at the total of "ANC 1st visits" no matter where they actually took place, it makes a lot of sense to use this dimension as the data element dimension. Don't panic! These concepts will be covered in this course.

[Hide Answer](#)

You have used 1 of 2 submissions

[SUBMISSION HISTORY](#)

[STAFF DEBUG INFO](#)

Figure 7-11 Part 2/2 of Assignment Session 1(Paperforms to Datasets)

Courseware Course Info Discussion Wiki DHIS 2 Implementation Guide Progress Instructor

Course Overview & Getting Started

Session 1 - From paper forms to datasets

Introduction of the paper form

Assignment - Paper Form
Short Assignment due Aug 31, 2015 at 00:30 UTC

Context of the paper form

Assignments - Context of the paper form
Short Assignment due Aug 31, 2015 at 00:30 UTC

Section 2 - Context of the form

Section 3 - Analyses of the form

Section 4 - Organisational hierarchy

Section 5 - Data elements

Section 6 - Creation of the form

Section 7 - Wrapping up

VIEW UNIT IN STUDIO

ASSIGNMENT - INFORMATION CYCLE (1 point possible)

INFORMATION CYCLE

Please label each of the item of the information cycle.

The diagram illustrates the Information Cycle as a circular process. It consists of four colored rectangular boxes arranged in a circle, connected by arrows indicating a clockwise flow. The top box is red, the right box is green, the bottom box is purple, and the left box is orange. The orange box contains the word "Dissemination". Below the diagram is a horizontal navigation bar with five empty boxes. The third box from the left is labeled "Analysis", the fourth is "Decision and Action", and the fifth is "Collection and Processing".

Check Reset Save Show Answer You have used 0 of 2 submissions

SUBMISSION HISTORY STAFF DEBUG INFO

S2_Level1/2015_Q1/courseware/b8790c2381c44820bfe71b11a11c76e8/7b65c4e26f2440f19b5021a60962b0c8/

Figure 7-12 Assignment 2 Session 1(Information Cycle)

Displayed in the figure above is a designed assignment where the learner is instructed to drag the fitting labels into each of the coloured boxes. For this assignment a different interactive functionality named 'drag and drop' was used, the user right-clicks on the label by dragging the label itself over to the box.

View this course as: Staff

Courseware Course Info Discussion Wiki DHIS 2 Implementation Guide Progress Instructor ← Menu 1.

Sections 2.

VIDEO

YouTube

Download transcript .srt Download transcript here 3.

CHECKBOXES (1/1 point)

The 3 dimensions of data in DHIS2 are:

Select the answer that matches (several choices possible)

why - the reason
 how - the process
 what - the event
 who - the patient
 where - the place
 when - the period

Final Check Save Show Answer You have used 1 of 2 submissions

STAFF DEBUG INFO

4. ← Learning sequence

SUBMISSION HISTORY STAFF DEBUG INFO

Figure 7-13 Information Video with assessment method

In the figure showed above we provide the same process, a short video snippet which is about 1 minute and 10 seconds long. Here we do the same as we did for the video about the paper forms, where we explain the topic and demonstrate with animated Power Point slides in the video on what the concept is revolved around.

The assessment method applied here is a multiple choice assignment where the learner can 'check' if the answer is right and 'save' in order to 'show the answer'.

In order for the system to auto-grade the assignment, the learner has to click the 'final check' button.

In the video player, the platform allows the learner to follow click-on transcripts (see step 3), the video player also has custom extensions that where the learner can adjust video speeds and view the transcripts in other languages.

The screenshot shows the discussion forum interface for the course 'HISP: DHIS2_Level1 DHIS 2 Fundamentals'. The top navigation bar includes links for Courseware, Course Info, Discussion (which is selected), Wiki, DHIS 2 Implementation Guide, Progress, Instructor, and a 'Create a new post' button. The 'Create a new post' button is highlighted with a blue border. The main content area displays a list of posts under the heading 'All Discussions'. Three posts are visible:

- Post 1: 'How do I go to the next activity?' by STAFF, posted 8 days ago. It has 2 replies.
- Post 2: 'English track' by STAFF, posted 8 days ago. It has 1 reply.
- Post 3: 'Video is not playing' by STAFF, posted 8 days ago. This post is highlighted with a black border. It has 2 replies.

Below the posts, there is a large upward arrow icon and the text 'Posts are listed here'. The post 'Video is not playing' is expanded to show its details:

How do I go to the next activity?
question posted 8 days ago by staff STAFF
REPORTED

How do I go to the next activity?
(this post is about Support Forum / Displaying the next unit)

1 response

Add A Response

staff STAFF 8 days ago

Click the arrow.

Add a comment

Showing all responses

Figure 7-14 Discussion Forum

Earlier it was mentioned that we wanted the learners to introduce themselves in the Discussion Forum. The edX community states that the Discussion Forum is a critical component of an online course. They encourage an active use of this module in the initial weeks in order to monitor and

create its culture. On the other side, they further explain that after some time the forums tend to be self-supporting in terms of peer learning. They suggest using learners who are doing well in the current course or previous courses to serve as Community Teaching Assistants.

The screenshot shows a course page titled "HISP: DHIS2_Level1 DHIS 2 Fundamentals". The navigation bar includes links for Courseware, Course Info, Discussion, Wiki, DHIS 2 implementation Guide (which is highlighted), Progress, and Instructor. The main content area displays a PDF document titled "DHIS2 Implementation Guide". The left sidebar lists chapters from "Front Material" to "Chapter 17". The right sidebar shows the version "2.19". The PDF content includes the title "DHIS2 Implementation Guide" and the "dhis2" logo.

Figure 7-15 Learning Material divided up in chapters

As seen on the image above, we embedded a textbook as a PDF into the course site. When the learner opens this implementation guide in the course, they can navigate the book by chapter. In accordance to the WCAG guidelines for content providers, the edX community discourages the use of image files as textbooks for any course, as they are naturally not accessible to screen readers.

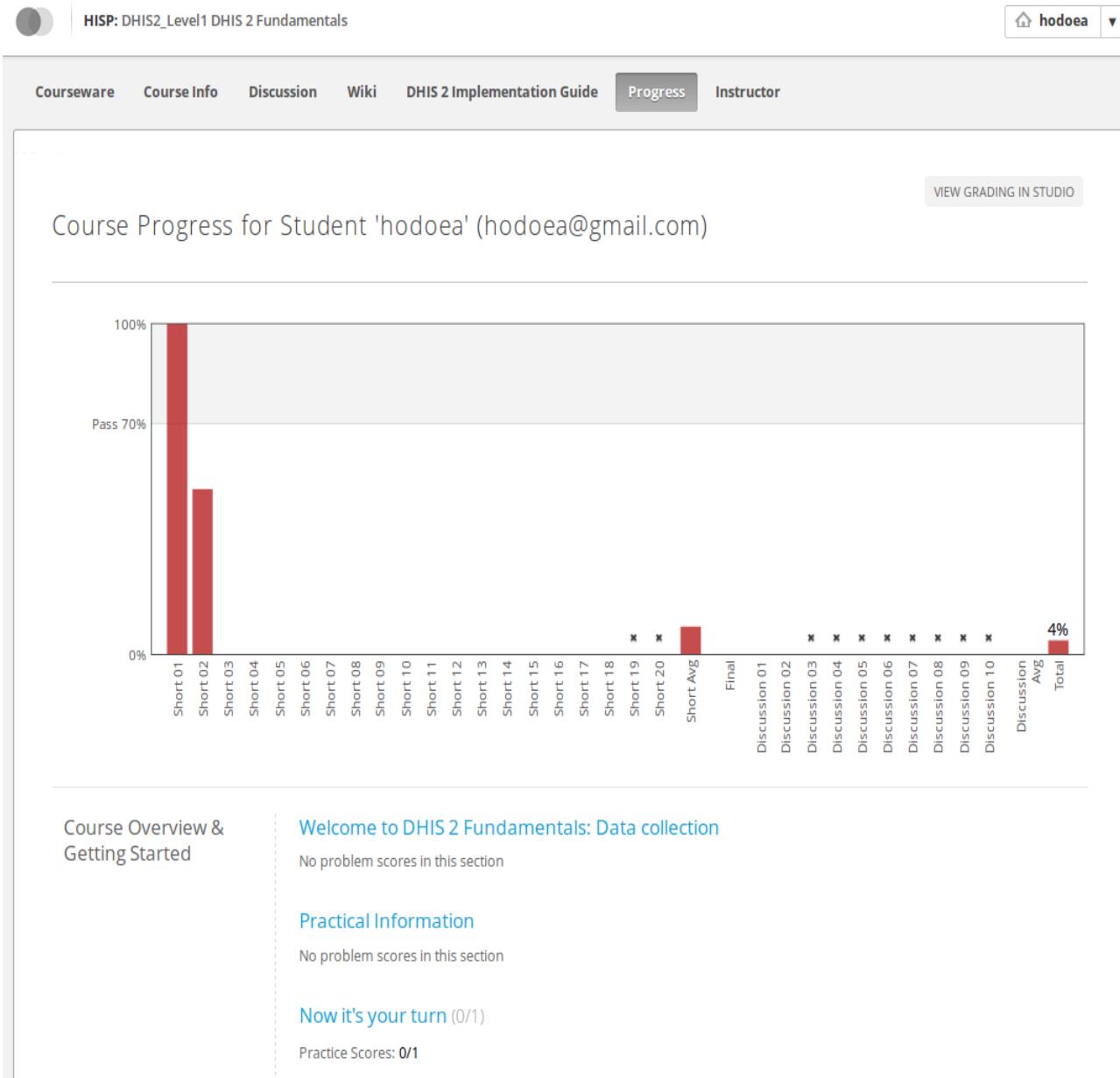


Figure 7-16 Visual Display of Learners Progress

Presented above is the *progress* page. The learner is presented to a chart with the grades for each assessment that he/she has taken during the course. The chart here includes y-axis labels for the grade ranges defined for the course. As mentioned earlier above, we set the passing grade to 70%, as it is the same passing grade for the onsite Academy exam.

In this chart display we can see that the learner has only submitted correct responses to two assignments, and his/her current total percentage grade in the course is 4 %. Here the learner can also get further statistics of how much each assignment was counted as. The type of scores is divided into practice scores and problem scores. The problem scores are the only one that counts for the overall grade.

7.3 The CMS- studio environment

The studio is the edX tool we used to build the course. Shown below, is the first interface after the course has been set up with its related information and titles.

The screenshot shows the CMS Studio interface for a course titled "HISP DHIS2_Level1 DHIS 2 Fundamentals". The top navigation bar includes "Content", "Settings", "Tools", "Help", and a user profile "hodoea". The main content area displays "Session 3 - Analyses of the form / Data sets". A "Unit" card is open, showing a warning about publishing changes. Below it is a "Add New Component" section with icons for Advanced, Discussion, HTML, Problem, and Video. To the right, the "Published and Live" section shows the last publish date (May 26, 2015) and release date (Aug 23, 2015). It also indicates visibility to staff and students, with an option to hide from students. Buttons for "Publish" and "Discard Changes" are present. The "Unit Location" section shows the location ID (5d6c924f4b8245b59889cdca2a484011) and instructions for using it in URLs. The bottom of the interface features a large search bar.

Figure 7-17 Course Organization Interface

Practical Information

Now it's your turn

Welcome to DHIS 2 Fundamentals

Session 1 - to datasets

Section 2 - the form

Session 3 - the form

Session 4 - Organisation

Section 5 -

Section 6 - the form

Section 7 -

Actions

Username: 2. Provide username in this field

[Reset Student Attempts] 1. Reset-button

```
is_released = Yes!
location = i4x://HISP/DHIS2_Level1/html/40ddd67b43f14f57a418ec1d0fe852c0
Module Fields
visible_to_staff_only      False
ispublic                      None
graded                         False
annotation_token_secret    xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
giturl                        None
edxnotes                       False
source_file                     None
course_edit_method            Studio
default_tab                     None
in_entrance_exam              False
showanswer                      finished
extended_due                   None
video_speed_optimizations   True
graceperiod                    6:00:00
format                          None
due                            None
start                          2015-08-10 01:00:00+00:00
editor                         visual
days_early_for_beta           None
max_attempts                   None
text_customization             {}
```

Figure 7-18Reset Student Attempts Interface

On the back-end side of the CMS, there is a feature that allows for the possibility to reset student attempts (see step 1). In order to apply this, the user name of the learner needs to be provided. This feature is available for every assessment method (see step 2).



Tools

Course Export

You can export courses and edit them outside of Studio. The exported file is a .tar.gz file (that is, a .tar file compressed with GNU Zip) that contains the course structure and content. You can also re-import courses that you've exported.

Caution: When you export a course, information such as MATLAB API keys, LTI passports, annotation secret token strings, and annotation storage URLs are included in the exported data. If you share your exported files, you may also be sharing sensitive or license-specific information.

Export My Course Content

 Export Course Content

Data exported with your course:

Values from Advanced Settings, including MATLAB API keys and LTI passports

Course Content (all Sections, Sub-sections, and Units)

Course Structure

Individual Problems

Pages

Course Assets

Course Settings

Data not exported with your course:

User Data

Course Team Data

Forum/discussion Data

Certificates

Why export a course?

You may want to edit the XML in your course directly, outside of Studio. You may want to create a backup copy of your course. Or, you may want to create a copy of your course that you can later import into another course instance and customize.

What content is exported?

The course content and structure (including sections, subsections, and units) are exported. Values from Advanced Settings, including MATLAB API keys and LTI passports, are also exported. Other data, including student data, grading information, discussion forum data, course settings, and course team information, is not exported.

Opening the downloaded file

Use an archive program to extract the data from the .tar.gz file. Extracted data includes the course.xml file, as well as subfolders that contain course content.

[Learn more about exporting a course](#)

Figure 7-19 Course Export Interface

In the CMS there is a feature for exporting all the course content that has been created (marked in blue). It is also possible to import course content that has been created within in another LMS.

This feature displays the support for integration and interoperability of the LMS.

Shown below, is a table that presents the various elements that were found in the infrastructure of the LMS during the development process.

Findings	Description/Details	Activity
Integrative/Interoperability	Pre-survey: HTML-embeddable, export and import courses, YouTube embeddable videos.	The CMS technology.
Consistent and modern interface	Sections, subsections and units. By default, the CMS within the platform involves 4 types of components: Video components Problem components Discussion components HTML components	During the creation of the content structure for the online course. The LMS and CMS interface
Learning Material	The process of creating and editing screencasts.	Content Development
Learning sequences	The interactive functionalities of the learning sequences.	During the assessment session. CMS-->LMS

Table 7.1 Summary of empirical findings

8 Evaluation

In light of the fourth phase in the AR cycle, the evaluation stage, there will presented two evaluation rounds based on the screencasts and the usability of the LMS with the designed content from two selected learning modules. The evaluation method of the usability and UI of the LMS will be based on the method, *think a-loud*.

8.1 Usability Evaluation

I conducted a usability test called; *think a-loud* with four test participants with a health background. The test aims to discover what users really think about a UI (User interface) design. Nielsen (2012) explains that the advantages of the test usually let the designer learn why users guess wrong about some parts of the UI. You hear users' misconceptions about the design elements. On the downside, the test is conducted in an unnatural situation, and the test participants may struggle with the continuation of speaking their thoughts out loud.

A pilot-test was conducted first to make sure the test was facilitated correctly with the technical aspects, such as recordings. The tests were recorded through screen casting, in order to review them properly afterwards. So that I could study closer how the participants navigated around in the course interface while solving the given tasks.

The evaluation was based on three success dimensions in an evaluation framework explained by Holsapple & Lee-Post (2006) as the following:

- **Use**

In this dimension the aim is to investigate whether the participants were able to conduct the given tasks, this is based mostly on the usability of the interface and the feedback from the system.

- **User Satisfaction**

In this dimension the aim is investigate the overall user experience of the learning environment. It could for example be targeted to exploring the participants' views on the design of the UI itself.

- **Information Quality**

In this dimension the aim is to investigate the formulation of the sentences in the UI and whether the wording of information itself made sense or not.

Task list

The table below displays a list of the usability tasks that was created for the test participants and handed out to each participant before the test.

These were based on a few single selected online learning modules from section 7.2.

Task list

- 1. Watch the video (about the Paper form) in Section 1.**
- 2. Go to the assignment that is to be followed on the next sub-section and conduct this assignment.**

- 3. Go to the session 3 called “Analyses of the form” and watch the video.**
- 4. Go to the assignment that is to be followed below and conduct this assignment.**

- 5. Go to the discussion forum and create a post (you can write whatever you want, this is not the test).**
- 6. Click on ‘Progress’. Share your thoughts on what you think this is and how this works out.**

Table 8.1 Usability Task list

These tasks were chosen because of their variety of assessment methods, one is based on multiple choice questions and the interactive paper form assessment tool, see figure 7.10.

The video in task number 1 is about Paper forms, the idea of this video is amongst others to explain what paper form should be filled out with and the background and purpose for it.

The assignment in task number 2 is related to the content that was shown in the video described earlier. It has the following title and text description:

Assignment – Session 1 – Please click with the cursor of your mouse in the area within the image that displays the dataset you will learn to build during this course, see figure 7.9.

The video in task number 3 is about the three dimensions of data in DHIS 2, and the video contains a narration with the use of animations in Power Point.

The assignment in task number 4 is about answering the following multiple choice questions shown in the figures below:

CHECKBOXES (1/1 point)

The 3 dimensions of data in DHIS2 are:

Select the answer that matches (several choices possible)

- why - the reason
- how - the process
- what - the event
- who - the patient
- where - the place
- when - the period

Show Answer

You have used 2 of 2 submissions

Figure 8.1 Assignment 2 Part1/2

CHECKBOXES (1/1 point)

In DHIS2 the 3 dimensions of collected data are called:

Select the answer that matches (several choices possible)

- data elements
- health facilities
- periods
- events
- organisation units
- data collection

Show Answer

You have used 2 of 2 submissions

Figure 8.1 Assignment 2 Part 2/2

Task number 5 is about the use of the discussion forum, see figure 7.14 in chapter 7.

I asked the participants to locate the discussion forum and create a post. The aim here was to observe whether or not the forum was easy to understand and use. All the four participants were able to locate the forum and create a post in the discussion forum.

In task number 3, learning objectives are showed at the end of the video. The learning objectives described in the first video was to:

- Reproduce the previously shown sections of the form in DHIS 2.
- Make it available to a number of health facilities.

In the last task the objective was to locate the progress page and have the users explain the page out loud of how this may work out.

Results

All the participants managed to solve the given tasks, and they were able to locate the items based on the titles easily. However the interactive functionality behind the assignment showed in figure 7.10, was difficult for the participants to figure out in the beginning. The functionality is to place the green circle by clicking outside the area of it to move it to the desired area. The answer to this task is shown in the video earlier viewed by the participant.

In average the tests took around 25-35 minutes to conduct each. This was including the preparations of informing and explaining the participants the procedure of the method.

It turned out that one participant had experience with edX from before and was therefore familiar with the format.

One participant wanted the video in the third task to show the learning objectives as well.

It was also observed that the participants did not notice the download feature (see figure 7.13) of the videos, as I asked them at the completion of each test and then pointed out this feature.

The interface of assignment number 2 is larger than the other assignment pages, for this reason the user has to scroll down to see the rest of the page, see figure 7.9.

Two of the participants did not notice that they had to scroll further down the page to locate the ‘show answer’ button in order to check if they had provided the right answer.

One participant spent almost a minute longer to locate the button to create the post in task number 5. However the other three participants spent about the same amount of time with little difference.

8.2 Screencast Evaluation

The evaluation consisted of feedback based on technical aspects of the editing as well as explanatory aspects.

Most of the feedback was about timing, which is revolved around matching what was being said and shown on the screen at the same time. One example of this is the following quote from a project member who conducted the evaluation:

“I think the strength of screen captures is in the timing, which has to have a match between vocal and visual. These are 15 seconds of silence in which a lot of actions happen.”

For the indicator screencast, the following was commented on:

“When discussing creating a new indicator, I think it might be beneficial to use zoom.”

“When mentioning the question mark (approx. 6:40), it is good to maybe somehow highlight the location of the question mark visibly on the screen.”

“Also, I am thinking: would it be good to remind the viewer of where this table is coming from? (I think you actually show this at 3:10, but it is good to show this here or say you will discuss this later in the video). We land into a screen from a previous video, but if we want people to be able to watch these videos separately, it is good to briefly show how we got into this screen so the viewer can get there/ where this part is located in DHIS. If you have not seen the previous video, you might guess it is an excel document, but I can't see it very well.”

These are examples of the challenging aspects that needed to be met during the production and editing of a screencast. Knowing when to add the technical features such as zoom in effect and knowing when to place it in the video, was quite difficult. This is also tightly linked with the pedagogical aspect of the screencast as this can affect the learners learning outcome at the end.

Summary

The findings from this evaluation can be defined as the following elements:

- Synchronizing the sound and picture.
- Highlighting screen features with zooming.
- Reminding the viewer of the previously taught elements i.e. creating recaps.

8.3 Reflection upon Evaluation Cycles

The technical concern people may have with online education is now probably more related to technological design in terms of user experience and interaction design. That is why the evaluation tests of the usability and user interface of the online course need to be tested more thoroughly than it has been done in this study.

The two factors which were evaluated were identified by Sun et al, (2008):

- Perceived usefulness and ease of use.
- Course quality

The videos became harder to edit and create when it became more detailed.

The challenging part was to figure out how to edit the screencast without losing important knowledge for the learner.

The most challenging factor during the production phase appeared to be the content quality of the learning material that was translated (the screencasts).

This was discovered through the evaluation part; where the time for translating the learning material took much longer than anticipated. Editing the screencasts took much longer than expected

This process is also still not finished up as there was not enough time for a second editing of the material based on the feedback on the screencasts.

This is linked with the information quality of the content in the screencasts and part of the critical factor, identified by Holsapple and Lee-Post (2006).

It was revealed that the key factor for success in online course design, course quality i.e. information quality of the content that is translated was the most time-consuming part.

For any online course that intends to demonstrate screencasts where the use of the software is displayed, there needs to be an awareness of the challenge with the design of the screencast.

This is in regards to the editorial factors such as when to use zoom-in views and when to emphasize the most essential learning elements from the video. The last element is especially important as the aim is to provide the learners with skills and knowledge to implement the software.

9 Discussion and Specifying Learning

In light of the 4 phases in the AR cycle previously presented, I will present a discussion based on the last phase which is to specify the learnings derived from working with the various development areas of the online course and the learning environment itself. First there will be a section on the pedagogical element as well as a sub-section on instructional design. Then I will present a section on reflections upon the research approach. In the final end of this chapter, I will discuss the limitations of the study and how it impacted the final result

9.1 The Pedagogical Aspect

For this online course, the video content is the most important learning material, as this is where most of the course material is to be conveyed. This material needs to be further carefully evaluated in order to achieve a good course quality. In the editing process of these screencasts, the most challenging part was to figure out how to convey the most important elements in the screencasts, from a pedagogical perspective, see section 7.1.2.

According to the edX guide and the guidelines of editing videos was to split the videos if they were long, as the recommended duration for a video was from 5-7 minutes (Guo et al, (2013)).

This was because videos that are longer than 10 or 15 minutes risk losing the attention of the learner. Therefore the longest screencast that was produced was 7 minutes and 18 seconds and the content of that was about indicators.

One of the challenges which were mentioned regarding online learning was feedback, see section 2.2.2. In order to cope with this, the edX community has tried out a learning strategy where they have implemented a learning sequence technology. Here the learner can practice the concept of the videos with an interactive learning exercise, see section 8.3.

In order to know the learners level of skills and understanding once the course is launched, I designed a pre-course survey, see figure 7.8.

During the translation of the learning material it became apparent that there is a need for pedagogic strategies for the online course in order to design effective online learning outcomes for the potential user groups. In order to foster an online community, the idea is that the discussion forum

will be the component which will serve as the connection bond between the learners. That way the learner can participate freely and communicate with other learners.

9.1.1 Instructional Design

When it comes to the pedagogic strategies, one suggestion here could be to provide an instructional designer solely dedicated for the further translation of the online course.

“Instructional design involves the process of identifying the skills, knowledge, information and attitude gaps of a targeted audience and creating, selecting or suggesting learning experiences that close this gap, based on instructional theory and best practices from the field.” (Malamed, 2010)

Learning objectives and practical goals for the online course were designed throughout the development process, but there was no plan for a specified instructional design process of the learning material that was to be translated. There was only a plan for the practical work that needed to be translated but not a specific plan on how to properly design the translated material.

An instructional design plan is needed in order to properly translate the learning material for the course. This issue became apparent during the editing process, the main challenges were on figuring out the type of content that needed to stick for learner.

The pre-survey was used in order to map the users' expectations and skills for the course.

This was done in order to allow the course team to get an overview of the participants' competencies'. Based on the feedback on this survey at the end of the launch of the course, it can help serve as a guideline to adjust any course content later.

The analysis from the questionnaire given to the onsite participants helped in mapping the most preferred aspects and objectives during the first design of the online course.

9.2 Reflection upon Research Approach

The process of creating the online course was in this stage an opportunistic top-down approach in terms of screencasts captured on the field study with the trainers and set in post-production afterwards by me. One of the strengths of action research is the involvement of the people within the organization where the research is applied through various iterations. The trainers were used actively for feedback on the questionnaire survey during the field trip as well as creating the raw material for the screencasts.

In AR it also common to have a dual role in this setting, in this study I was both the practitioner and the researcher. I had a collaborative involvement; however balancing these two roles was a challenge. At times there was an uneven balance where I focused more on the practical elements in the research project while I should have been more attentive to theory development of the practical work at the same time. As this is the common feature in an AR cycle.

It would have been perhaps interesting to conduct Participatory Design (PD) as an additional research method from the beginning of, especially during the development process of the content material.

The work behind the translation of the learning material and working with the CMS revealed a vast design process behind the online course. Including the potential user group in the design of the course would be highly encouraged in the continued work on the online course. This will take longer time for the translation and design process, but it may result in a better designed course.

For a PD approach, an interesting strategy would be to gather data on the participants view the interactive functionalities that are implemented in the online course.

This type of research could work as a beneficial evaluation study of the whole learning environment and experience for the DHIS 2 online Academy.

The interviews were mostly focused on getting to know the trainers teaching method, and how they prepared the material. This was because the task for the online course was to prepare material for the online course. In hindsight during the work I conducted with the research team within the learning platform, I realized it would have been more beneficial to get their views on the design of the platform and the translation of the learning material.

In addition the questions I asked the trainers were mostly about trying to figure out how they trained and what their teaching methods were like, since the main task for the online course was to translate

teaching material. I realized that most of the answers were not beneficial as it would have been more interesting to ask them some of the similar questions I asked the participants.

For example, what kind of design elements or aspects would the trainers' views as beneficial to incorporate in the online course? Is there something in an online learning environment that they feel could have helped them train the users' better onsite?

These are questions I realized would be highly relevant and beneficial to explore in the translation process. The iterative stages in the chosen research method allowed for the opportunity to reflect on the learnings that emerged during the study.

One of the challenges with designing an online course is to figure out to which extend the online course design is answering the participants' needs and expectations.

In order to cope with this challenge in this research project, there needs to be conducted alpha and beta tests of the complete online course as well as the all of the learning material. The tests need to have a high focus on the feedback of the type of designed learning material and the practical sessions where the user is expected to perform the various related tasks in the learning platform.

Naturally, if the course is designed poorly, this will automatically impact the learners learning outcomes of the online course. There needs to be a focus on testing the way the content is to be taught during these two phases.

9.2.1 Limitations of the Study

There are several limitations to this study. The evaluation of the usability test should have been conducted on participants on the onsite Academy as a second iteration. Instead it was conducted with participants who were mimicking the target group. This weakens the validity of the results from the usability evaluation. If there was more research capacity available I could have included more than one Academy for a broader range of participants as well as including potential participants who cannot go to the academies.

The usability test revealed that it was easy to understand as all the participants were able to solve the given tasks. However it may be that there are several other issues that a test participant from the real target group may have uncovered especially regarding the learning material.

The target group holds a diverse background both in terms of nationalities and field of work.

The most suitable place to test the learning environment before the official launch of the online course is with few participants from one of the onsite Academies.

The evaluation of the screencasts and the UI was only done in one round, in accordance to the evaluation phase in the AR cycle; the ideal setting is to conduct the same evaluation again and measure if there are any improvements.

The think-aloud test was not sufficient enough alone to test parts of the prototype course; it would be more beneficial to conduct workshops as well.

Due to limitation of time throughout the study, only two out of the five critical factors accounted for users' satisfaction identified by Sun et al (2008) were evaluated.

Van Someren et.al, (1994) writes that not all tasks or subjects are equally suited for the *thinking aloud* method. There could have been a difference between the various test participants and how they perceive the tasks they were given. It is difficult to measure this with the chosen method.

Some test participants were very outspoken and shared many thoughts, while others were focusing on getting the questions right and sometimes ended up in silence for parts of the test.

I had to quickly ask what some participants were thinking of during these silent times, in order to produce more data from them. In general, Van Someren et.al, (1994) explain that how people share their thoughts depend on their social behavior, when selecting test participants, it is important to make sure that the test participants are not so shy. The participants for this evaluation were not shy, but it became apparent that they struggled with the continuation of speaking out loud through the test.

Because of time considerations there was not possible to finalize all the learning material and the whole online course. The research group is in the process of continuing the translation of the learning material and finalizing the online course.

10 Conclusion

This chapter sums up the findings related to the research objectives and the research questions previously stated in the beginning of the document. The overall conclusion that is presented here is based on the experience of working with translating course material and the designed learning modules in the LMS. The empirical findings from the study were based on interviews, observations (usability method, *think-aloud*) and a questionnaire survey. In addition, a learning platform has been selected guided and evaluated by literature reviews and document reviews provided the DML group at UIO.

The respondents from the questionnaire of the participants and the usability method gave the most important guidelines during the shaping of the course.

The research question of this thesis was the following:

- **Which aspects are important in an online course for implementers of an open source software system?**

In order to develop online courses which are relevant for the implementers' backgrounds, the target group should be involved in the development process. Online courses present several benefits for the DHIS2 Academy target groups, especially in terms of flexibility and access.

The learning material is easily retrieved from the platform and with online learning the learners can get a more tailored learning experience. However there are naturally several constraints with the online course such as the availability and presence of the facilitator who can clarify issues or questions. The online course should be developed with an objective to cope with this challenge.

Based on the experience of working with the AR cycle as a framework, the evaluation cycles were found to be most important during the translating of the learning material.

Ease of use was an important factor that was stressed by the respondents on the survey regarding the design of the online course. This factor is also related to the usability aspect and the user experience. Navigating the user interface of the LMS should be easy to use and intuitive as possible. In order to measure this, two learning modules was tested based on a usability evaluation method, *think a-loud*.

The test participants were able to conduct the given tasks that were created for the observation method, although there were some elements that they did not notice in the UI such as the download feature or the transcript feature. It may also be that there are other issues that may not have been uncovered due to the scope of the test material and the allocated time for each task.

In addition it was stressed from the survey respondents that the presentation of the material needed to be short and simple with clear video and sound. This was attended to during the design of the screencasts and videos which were based on the recommendation guidelines set by Guo (2013).

The findings from the study revealed that flow charts, videos and screencasts were the most preferable teaching methods for the implementers of the software.

The contribution of this study provides an insight into such a process through the appliance of an AR cycle. These findings have contributed to current knowledge on creating online courses in the following way: pedagogical aspects and evaluation findings.

10.1 Further Research

In a further study it would be valuable to evaluate the various learning outcomes and learning experience in the traditional course versus the online course once it is launched for its first course run. By giving an outline and measuring the different learning outcomes of the translated learning material and the learning environment, it could help promote a better understanding of how to shape the online course for the implementers.

This could probably also help in assessing the tools and technologies of each of the learning experiences from the designed learning modules.

It was also previously mentioned that Participatory Design workshops with learners representing the target group could be a way forward during the continued process of the design of the online course. During the evaluation of the online course it would be interesting to study the interaction and presence in the online course and evaluate the student performances based on the use of resources in the learning platform. Similar to the study conducted by (Breslow et al., 2013). What resources do the online learners find most engaging? Also other factors to explore more in the online course once it is held is motivation and engagement, which were elements related to creating an online success design as mentioned by Savenye et.al, (2001).

It would also be interesting to study if there are cultural differences in online learning, as the targeted group is diverse. In addition, to study closely the relationship with course design in the platform, learning outcomes and learning processes.

The discussion forum is highly relevant to do research on because of the group dynamic that may occur after the launch of the online course, thus examining how the learners use the discussion forum.

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12. Appendix

Appendix A - Questionnaire Guide For Participants

Questionnaire [The Online Academy]

HISP Oslo is creating an online course based on the sessions from the onsite Academy Level 1. The goal of this online course is to give participants that can not be on an onsite academy the opportunity to train, learn and share experiences on DHIS 2.

We want to ask you a few questions to understand your point of view of an online course.

Age

Svaret ditt

Country

Svaret ditt

Organisation

Svaret ditt

Role in the organisation

Svaret ditt

1. To which extent could the sessions of this Academy be taken ONLINE?

- Not at all
- To a small extent
- To some extent
- To a great extent

2. I would prefer to use these teaching materials/methods for an online course?

	Agree	Somewhat agree	Somewhat disagree	Disagree
Online Documentation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Screencasts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Videos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recorded Interviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. I would like to follow these topics online.

	Disagree	Somewhat disagree	Somewhat agree	Agree
The three core dimensions. (The 'What',the 'Why' and the 'Where').	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data Entry(Data sets)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data Analysis(Pivot table, graphs, GIS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mobile Topics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DHIS Tracker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
M & E	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
System Admin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. How likely are you to ask a facilitator for help?

- a. Very unlikely
- b. Unlikely
- c. Likely
- d. Very Likely

5. How willing are you to participate in a online forum?

- Not willing at all
- Somewhat willing
- Moderately willing
- Very willing

6. What would your motivation be for taking an online course.

Rate the following objectives: Where 1 is the highest and 3 is the lowest motivational aspect

	3	2	1
To gain knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To receive certificate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To build a career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To improve my performance on my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Is an online Academy Certificate as valuable to you as an onsite Academy Certificate?

- Less valuable
- Equally valuable
- More valuable

8. What type of device would be suitable for you when taking an online course?

	Suitable	Very suitable	Somewhat suitable	Not suitable at all
Laptop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mobile Phone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tablet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. How many hours per week would you dedicate to an online course?

- < 5 hours per week
- 5-10 hours per week
- 11-15 hours per week
- > 15 hours per week

10. Have you taken an online course before?

- No
- Yes

Do you have any comments? Please fill in the comment field below and let us know your view of an online learning.

Svaret ditt

Appendix B - Interview Guide For Trainers

Interview Guide For Academy Trainers (Semi-Structured interviews)

General questions:

Gender:

Age:

City/Country:

Type of organization:

Role in the organization:

Subject 1: Learning Methods And Learning Tools(Digital and Non-Digital)

1. How did you become a trainer in the Academy?
2. How do you develop your course content?
 - a. Do you create your own content?
 - b. Do you use other people's content?
3. How would you support a less experienced learner and a more experienced learner?
4. What are the challenges that you meet upon during your teaching? (Probe)
5. What kind of preparations have you done before the session, tell me about the process?
 - a. Who has assisted you?
 - b. What learning tools did you use for the preparation?

Subject 2: Open Subject(Design input)

- Thoughts on ideas for designing the online learning course
1. As an instructor, what expectations do you have for an open online course?
 2. What is the take-away/output you wish for the students to attain after your session?
 2. In terms of importance rate the following abilities you would like a student to acquire after your teaching:
 - a. Collaboration skills.
 - b. Communication skills.
 - c. Knowledge/remembering
 - d. Creating content(charts/diagrams)
 - e. Comprehension/understanding

Appendix C - Interview Guide For Participants

Interview Guide For Selected Participants (Semi-Structured interviews)

General questions

Gender:

Age:

City/Country:

Type of organization:

Role in the organization:

Subject 1: Learning Methods And Learning Tools(Digital and Non-Digital)

1. What do you expect to learn from this Academy?
2. Which teaching form do you learn the most of in this course?
 - a. Demos/slides/assignments/group work.
3. Which teaching forms do you like the least of in this course?
 - a. Demos/slides/assignments/group work.
4. When do you **most** want to discuss the material in this course with your peers? Instructor?
5. Which assignments/class activities were **most** helpful for you in this course?
6. Can you explain in your own words the activity/assignment you were given? // Here I can find out if there is differences between the participants perception of the assignment, who really understood the task?
7. How do you feel about the learning methods of the DHIS trainers?
 - a. What was good? And what could have been done better?
 - b. What do you feel about the given time for each assignment/activity?
8. Which topics of this academy could you have been able to follow online?
9. What is the best way to learn after your experiences at the Academy?

Appendix D - Consent Form

Consent Form for Participation in a Research Study.

“The Online DHIS2 Academy”

Background

My name is Hodo Elmi Aden and I am a graduate student at the Department of Informatics at the University of Oslo. I am undertaking a research project for my master's thesis. The title of this project is: The Online DHIS 2 Academy.

The objective of this project is to create an online learning environment.

This research project is within an ongoing project that is run by HISP.

The main supervisor for this thesis is Matthieu Pinard, community coordinator for the DHIS 2 Academy.

During this study you will be asked to answer questions relating to the DHIS 2 Academy.
The research project will end at: 01.08.2015.

Voluntary participation

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

I understand that my responses will be kept strictly confidential. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.

Upon completion of this project, all data will be destroyed or stored in a secure location

Contact

If you have any questions or concerns about this study or if any problems arise, please contact Matthieu Pinard or Hodo Elmi Aden. Email: matthiep@ifi.uio.no, hodo@usit.uio.no.

Phonenumber(Matthieu): +47 91733409. Phonenumber(Hodo): +47 98462273.

Consent

I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Participant's signature _____ Date: _____

Appendix E - Evaluated Learning Modules

1.

Courseware Course Info Discussion Wiki DHIS 2 Implementation Guide Progress Instructor

Course Overview & Getting Started

Session 1 - From paper forms to datasets

Introduction of the paper form

Assignment - Paper Form Short Assignment due Oct 07, 2015 at 00:30 UTC

Context of the paper form

Assignments - Context of the paper form Short Assignment due Aug 31, 2015 at 00:30 UTC

Section 2 - Context of the form

Session 3 - Analyses of the form

Session 4 - Organisational hierarchy

Section 5 - Data elements

Section 6 - Creation of the form

Section 7 - Wrapping up

VIDEO - SESSION 1 - INTRODUCTION

MINISTRY OF HEALTH AND SANITATION
PHU MONTHLY SUMMARY OF REPRODUCTIVE HEALTH SERVICES - PHUFS

District: _____ Name of PHU: _____ Chieftain: _____
Reporting Officer: _____ Signature: _____ Month: _____ Year: _____

6:13 / 0:00 SPEED 1.0x ▶ CC STAFF DEBUG INFO

VIEW UNIT IN STUDIO

Hello, this video would be the introduction video to the course. I had this idea to take a very small version of the fundamentals course and limit it to data collection. So basically in this introduction video we will set the objective of the course and tell the student what will be the deliverable at the end of this course. So it can be something like that. So

2.

Courseware Course Info Discussion Wiki DHIS 2 Implementation Guide Progress Instructor

Course Overview & Getting Started

Session 1 - From paper forms to datasets

Introduction of the paper form

Assignment - Paper Form
Short Assignment due Oct 07, 2015 at 00:30 UTC

Context of the paper form

Assignments - Context of the paper form
Short Assignment due Aug 31, 2015 at 00:30 UTC

Section 2 - Context of the form

Session 3 - Analyses of the form

Session 4 - Organisational hierarchy

Section 5 - Data elements

Section 6 - Creation of the form

Section 7 - Wrapping up

VIEW UNIT IN STUDIO

ASSIGNMENT - SESSION 1 - PAPER FORM (1/1 point)

Please click with the cursor of your mouse in the area within the image that displays the dataset you will learn to build during this course.

ANC centre to tally sheet (PHU3)		DELIVERY over to tally sheet (PHU3)			
		FIXED	OUT-REACH	In PHU	In community
1st ANC visit				U/Birth	S/Birth
2nd ANC visit				U/Birth	S/Birth
3rd ANC visit					
4th or more ANC visits					
LLIN given at ANC					
1st Post natal visit at ANC					
2nd Post natal visit at ANC					
1st IPT dose given at PHU					
1st IPT dose given by TBA					
2nd IPT dose given at PHU					
2nd IPT dose given by TBA					

POST-NATAL CARE (PHU3)			
		FIXED	OUT-REACH
1st Contact (within 7 days)			
2nd contact (at 6 weeks)			
Vitamin A given postnatal			

TT for Pregnant Women (PHU3)		TT for Non-Pregnant Women (PHU3)		In Sub (PHU3)
TT1	TT1	TT2	TT2	
TT3	TT3	TT4	TT4	
TT5	TT5			
COMPLICATIONS OF EARLY PREGNANCY (refer to tally sheet PHU3)				
Complication	Managed at PHU	Retained	Decreased in PHU	Decreased in Community
Malaria in 1st trimester (treat with oral quinine)				
Malaria in 2nd or 3rd trimester (treat with ACT)				
Anaemia				
Hypertension				
Abortion				
STI				
Other (Hyperemesis, UTI, etc.)				
COMPLICATIONS OF LATE PREGNANCY (>22 Weeks) AND LABOUR (refer to tally sheet PHU3)				
Complication	Managed at PHU	Retained	Decreased in PHU	Decreased in Community
Pre-eclampsia/Eclampsia/Hypertension				
Ante-partum hemorrhage				
Obstructed labour				
Post-partum epistaxis				
Post-partum hemorrhage				
Fracture of Placenta				
Malposition				
Other maternal complications (anaemia, etc.)				
FAMILY PLANNING SERVICES (refer to tally sheet PHU3)				
METHOD	Number of clients			
	Newclients	Continuing clients		
Oral contraceptive pills				
Male Condoms				
Female Condoms				
IUD				
Injectables				
Implants				
Spermicide				

3.

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Courseware Course Info Discussion Wiki DHIS 2 Implementation Guide Progress Instructor

- Course Overview & Getting Started
- Session 1 - From paper forms to datasets
- Section 2 - Context of the form
- Session 3 - Analyses of the form
- Introduction
 - Core data dimensions
 - Data sets
- Session 4 - Organisational hierarchy
- Section 5 - Data elements
- Section 6 - Creation of the form
- Section 7 - Wrapping up

VIDEO



Hi! During this short video we will present you the three core dimensions of data in DHIS2. This will help you to better understand the structure of data in DHIS2. So, let's get started! Let's take an HIV pediatrics related symptom such as this one: Number of infants born to HIV Positive mothers registered in

Download transcript .srt ▾

STAFF DEBUG INFO

CHECKBOXES (1/1 point)

The 3 dimensions of data in DHIS2 are:

Select the answer that matches (several choices possible)

why - the reason
 how - the process
 what - the event
 who - the patient
 where - the place
 when - the period

Check **Save** **Show Answer** You have used 0 of 2 submissions

4.

CHECKBOXES (1/1 point)

In DHIS2 the 3 dimensions of collected data are called:

Select the answer that matches (several choices possible)

- ✓ data elements
 health facilities
 periods
 events
 organisation units
 data collection

Check Save Show Answer You have used 0 of 2 submissions

SUBMISSION HISTORY STAFF DEBUG INFO

5.

HISP: DHIS2_Level1 DHIS 2 Fundamentals hodoea

Courseware Course Info Discussion Wiki DHIS 2 Implementation Guide Progress Instructor New Post

All Discussions ▾ Search all posts

Show all by recent activity

A test 1
* FOLLOWING BY: STAFF

How can I watch the next video? 2
BY: STAFF

Welcome to Oslo 1
BY: STAFF

How do I go to the next activity? 2
BY: STAFF

English track 1
BY: STAFF

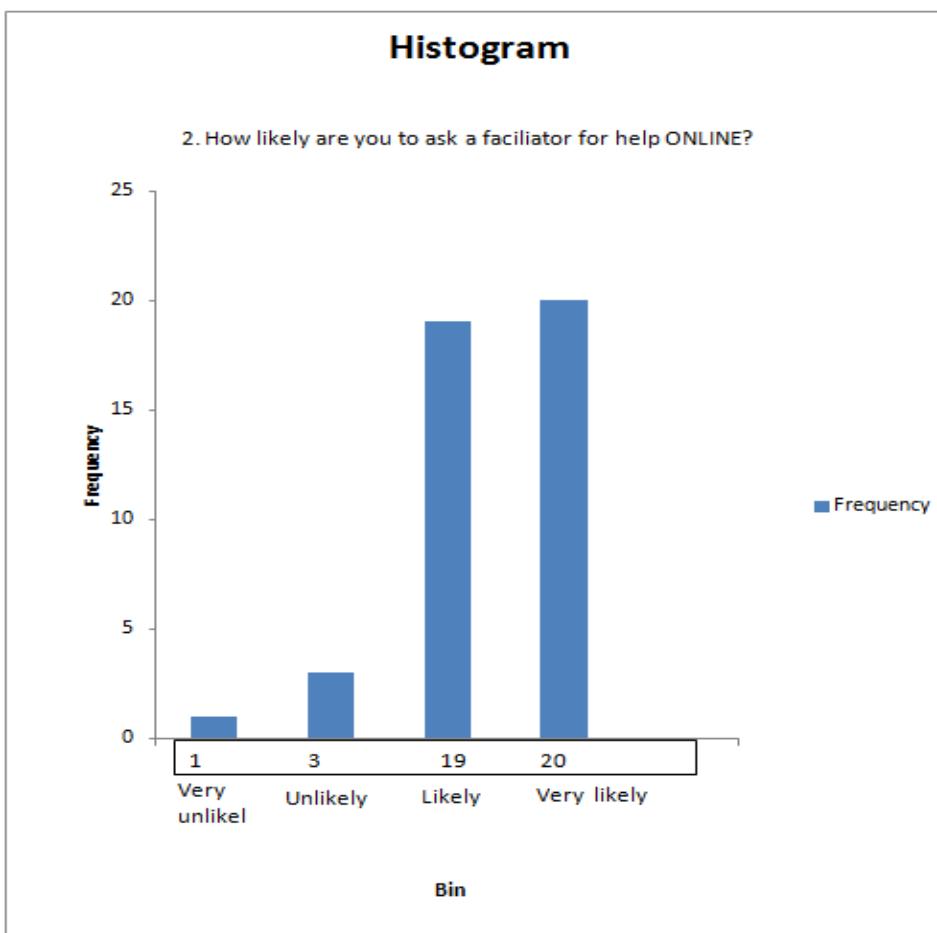
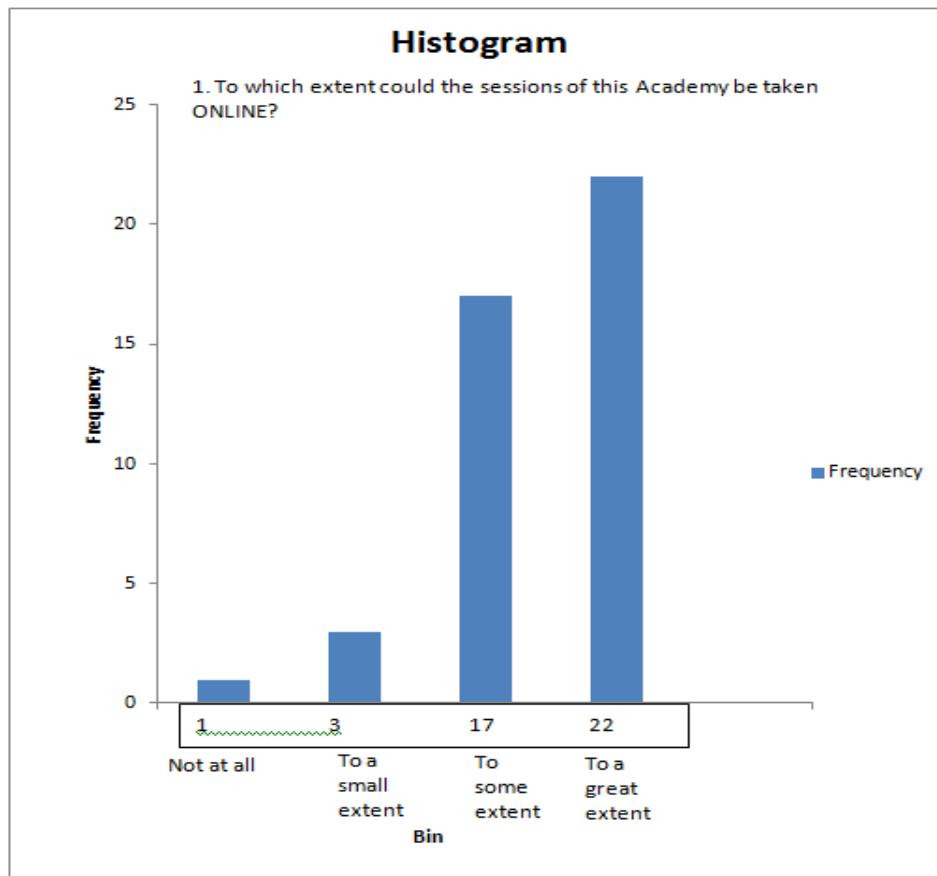
Video is not playing 2
BY: STAFF

DISCUSSION HOME: **DHIS 2 Fundamentals**

HOW TO USE APPSEMBLER OPEN EDX TESTDRIVE DISCUSSIONS

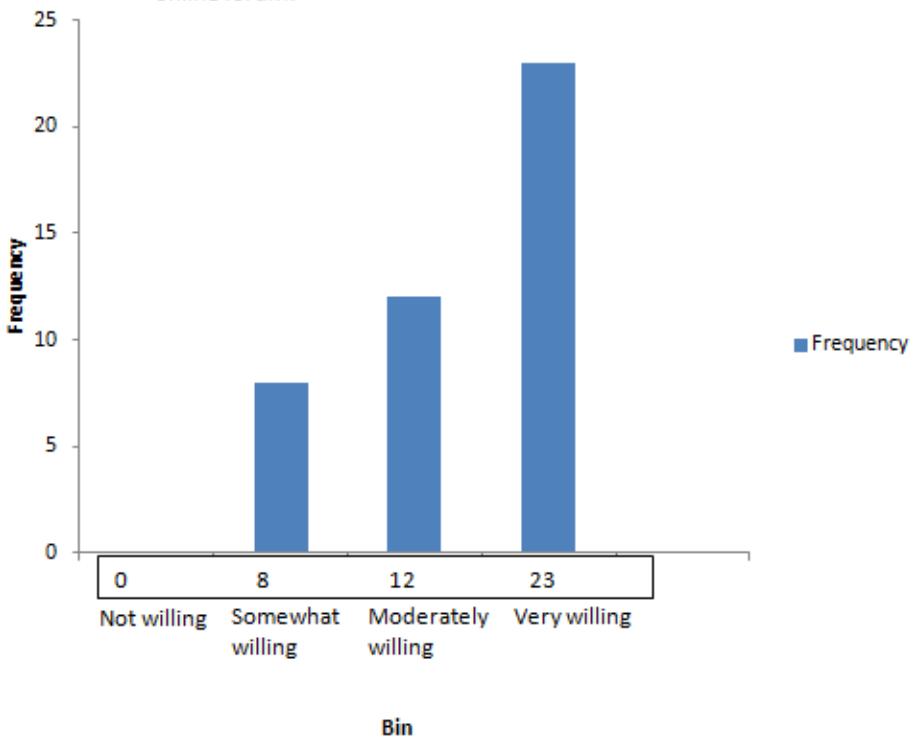
Find discussions	Focus in on specific topics	Search for specific posts	Sort by date, vote, or comments
Engage with posts	Upvote posts and good responses	Report Forum Misuse	Follow posts for updates
Receive updates	Check this box to receive an email digest once a day notifying you about new, unread activity from posts you are following.		

Appendix F – Questionnaire Results



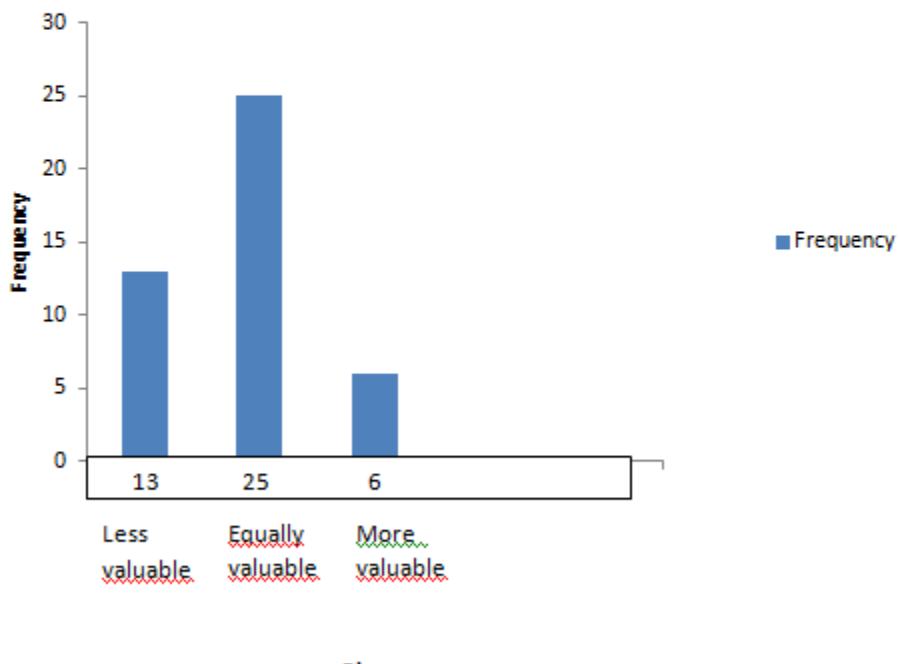
Histogram

3. How willing are you to participate in a online forum?

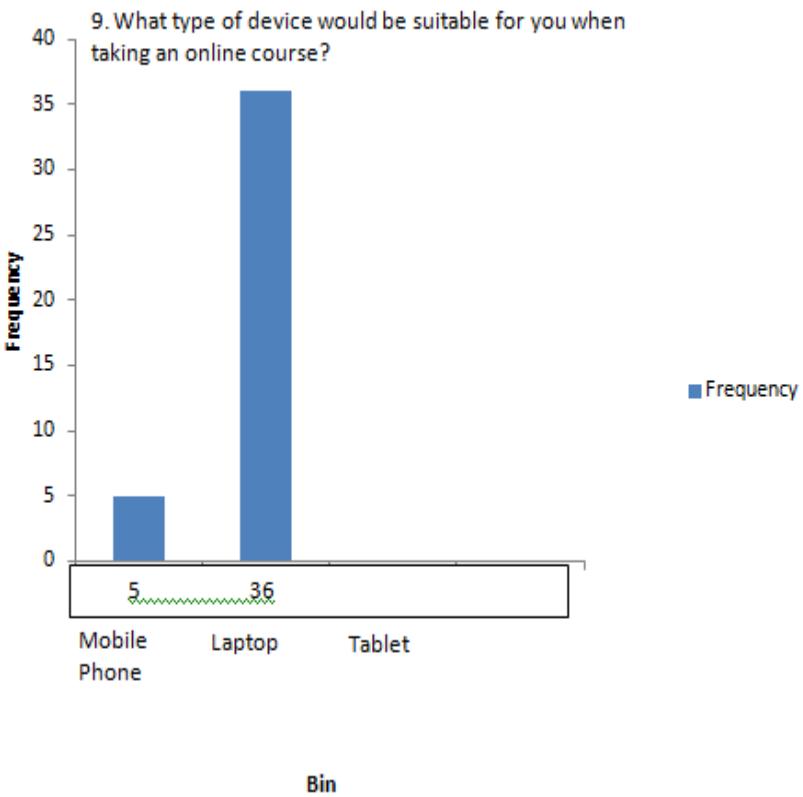


Histogram

4. Is an online Academy Certificate as valuable to you as an onsite Academy Certificate?



Histogram



Histogram

