

Web-based learning resources - New opportunities for competency development

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Abstract. Creating web- based learning environments holds great promise for on the job training and competence development in nursing. The web-based learning environment was designed and customized by four professional development nurses. We interviewed five RNs that pilot tested the web-based resource. Our findings give some insight into how the web-based design tool are perceived and utilized, and how content is represented in the learning environment. From a competency development perspective, practicing authentic tasks in a web-based learning environment can be useful to train skills and keep up important routines. The approach found in this study also needs careful consideration. Emphasizing routines and skills can be important to reduce variation and ensure more streamlined practice from an institution-wide quality improvement efforts. How the emphasis on routines and skills plays out towards the individual's overall professional development needs further careful studies.

Keywords. Design of web-based learning, competency development, certification and re-certification, eLearning

1. Introduction

Creating web-based learning environments holds great promise for-on-the job training and competence development in nursing [1]. This study takes place in collaboration with a large university hospital that is in the process of relocation and reorganization. Their goal is to standardize all work processes to ensure a patient-centric, best practice and treatment trajectories, qualify for ISO certification, and implement a system of certification and re-certification of specific skills and competencies. Use of web-based learning environments is one of several mediating artifact structures and cultural tools developed and introduced for skills training and competency development for improved practice and patient safety introduced to this work-life context.

In line with the overall purpose, we focus on the design of a web-based learning environment and how this resource is used by for introduction to and further development of practice. In this paper, we present some of features of a particular resource and pilot users' expressed experiences about the web-based learning environment, "skopvaktfunksjonen" [Function of the Scop-watch in Cardiology].

2. Background

Four nurses; three of them were experts from the cardiology section and one from the hospital's competency department developed the web-based learning environment. They decided on the content of the course, and collaborated with professional designers to create the actual pilot. To perform this work – scop-watch – the RNs must master procedures and routines for monitoring a patient's heart rhythm. This includes handling advanced technological equipment, procedures and routines for monitoring, variations and deviations, early interventions, alarms, codes for CPR, and communicating with nurses in other units [2].

Traditionally, experienced nurses introduced new nurses to the ‘scop-watch’ function on an individual or group basis. Their approach exhibited an apprentice model where the new RNs in the unit gradually acquired skills and were socialized into the work as they gained more knowledge and necessary skills [3]. Since “scop-watch” is as one of the activities where the hospital will seek ISO certification, a central goal is to standardize procedures and workflow. This strengthened their motivation to create this shared, web-based resource as part of the comprehensive program for certification and re-certification of nurses in the cardiac unit. When the program is completed, nurses can document necessary insights to assume responsibilities for continuous observation of monitored patients’ cardiac status.

3. Theoretical framing and methodological approach

The study aligns with a socio-cultural and activity theoretical approach to explore change and development and workplace learning and change [4,5]. We apply concepts from Cultural Historical Activity Theory in the analysis. The mastery of new concrete skills (i.e. object of activity) for patient safety (i.e. goal) is the primary unit of analysis. We are interested in development of artefact like the web-based learning environment, and how these tools mediate change and development [6,7]. We explored how the RNs talked about the resource as a tool for mastery of work through participation and socialization to the work [3] and expansion through knowledge construction processes in appropriation of tools and knowledge in a community [5]. This allows us to focus on co-evolution of tools and activity related to the use of the web-based learning resource. This study has a longitudinal and explorative design [8,9]. Our data corpus consist of media rich data including a) video recordings of design and pilot use of the web-based learning resource (23 hours); b) audio-taped, semi-structured interviews with users (n=6); c) field notes from participatory observation of the design process and the internal evaluation; d) analysis of the artefact itself and e) document reviews. For this paper, we report on the artefact analysis and how the pilot users found the web-based learning resource, therefore drawing on findings from the semi-structured interviews, field notes and artefact analysis. This combination of perspectives allows us to complement the informants’ perspectives and explore how the design/customization contributes to goals and purposes set out for the tool.

4. Findings

An important design strategy for the learning environment was to emphasize authenticity and model the work according to expected performance. The learning resource emphasizes interaction with the user and asks them to complete assignments and “simulations” of the advanced technical equipment.

In the artefact analysis of the web-based learning resource, we focused on the functionalities and strategies to scaffold learning at work when designing the tool. An important feature was authenticity, and emphasis is given to model and exemplify the work according to expected performance. The resource is structured in five modules, focusing on what the design team selected as the most important aspects of the work. For each module, there are specified learning goals, work sequences, interactive demonstrations and assignments where the user to practice performance of different tasks, and practice-focused tests. Pictures from the unit and of the equipment are used generously to illustrate these important aspects of the work [10].

The analysis of the artefact contributes information that complement pilot experiences and how the design/customization contributes to goals and purpose set out for the tool. Analysis of the semi-structured interviews with pilot users shed further light to the first users' experiences and how this approach to competency development is received. Several informants emphasize mastery of new concrete skills to perform aspects of the activity "scop-watch", and work according to same principles and work descriptions. This is captured in quotes like:

*It was a collection .. intense, compact part of practice at the scop [central unit] what you are supposed to do of the administrative function .. sort of. It was OK to understand, what you are about to go through (#5),
.. Everyone receives the same instruction so everyone will do exactly the same. With individual instruction can leave out this and that, or run out of time .. but here, one is a hundred percent certain .. the person receive the information about how things are done, this is correct. It's a security. Quality assurance .. (#3).*

When the informants were asked about the level they found the content to have, they provided feedback like:

*.. For newcomers, this must be extremely useful because it is so visual. You recognize when you are in the situation [everyday practice] ..It's very basic (#1).
.. Some was rehearsal, but learned something new .. for example if we receive an ECG from the ambulance we can forward it to Riksen [national hospital]. That is new. It is very well possible that I have heard it before, but I have forgotten (#4).
.. Should include more and maybe a higher level .. more about heart rhythms, recall of rhythms that is the most important aspect of our work.. Maybe something like "if you do not recognize this rhythm, go to his page (#2).*

Their perception of the web-based learning environment is an information- and knowledge resource, and they either emphasize everyday practice and experience as the most important guidance or emphasize directions by standardized descriptions found in the knowledge management infrastructure (PPS and/or EQS).

We also challenged informants to identify areas for further development and if there were suggestions to complementing content in the learning resource:

I thought a little .. we often have patients that, when they come to us in the beginning, we put them on 10-channel, and then some days later the patient get better and we put him on rhythm monitoring, with telemetry and they are walking around .. then we use a transfer procedure [on the scop].. that could have been included.. as you transfer the patient from one screen to another, you transfer the ST-alarms [settings], and with noise ST-alarms on the telemetry often goes off.. what we usually do is to turn that [ST-alarm] off .. the ST-alarms is not necessary with telemetry, because that is only rhythm monitoring (#5).

Lastly, we asked them what they thought about the simulation sequences and the possible impact for their practice as "scop-watch" and, ultimately, patient safety. One of them said:

Some are a bit ingrown. A good example is that we are supposed to print ischemia monitoring and trend for the past 24 hours, how it has developed, but when it's not used by the physicians, ..they don't look at them, .. then nurses just print and print, day after day. Many [nurses] don't print them, but it's one of the tasks, it says so here [points to the learning site]. It's bad for the patient .. developing an infarct that could be stopped at an earlier stage if someone had paid attention to the trends.. (#3).

Findings from the interviews show expressed excitement and satisfaction with the web-based learning environment, especially the strategies to attain authenticity and establish familiarity by pictures from the unit related to the tasks. The informants' suggested that with the current content and level of difficulty, the learning environment would be very appropriate for introduction to "skopvaktfunktionen".

5. Discussion

An important design strategy for this particular learning environment was to emphasize authenticity and model the work according to expected performance. Pictures from the unit and of the equipment to build sequences where the users interactively practice and demonstrate performance of tasks and activities contributed to ease of use. Creating an environment that allows practicing authentic tasks was seen as useful to train skills and keep up important routines, strengthen skills for early detection and more accurate treatment of cardiac conditions. Emphasizing routines and skills can be important from a patient safety perspective because it reduces variation and ensures a more streamlined practice from quality improvement efforts and the individual's overall professional development [11]. The affordances of the ICT tool in terms of interactive assignments and multi-modality allowed to practice aspects of cardiac monitoring. The assignments with "simulation" of tool-use included shared interpretation of work descriptions, early detection of signs of change in heart rhythm monitoring, and correct use of and exploitation of functionalities in the technical tools. To the nurses in our study, this was welcomed as a new opportunity for practice to use the tools, to become socialized into the work, and gain mastery through practicing in the virtual (simulated) environment.

As an information and knowledge resource the informants expressed two different perspectives: everyday practice and experience as the most important guidance, or the new, standardized work descriptions in the knowledge management infrastructure also implemented in the web-based learning environment. Perspectives on work descriptions and their roles in clinical practice are discussed in other studies [12, 13]; however, when challenged, all the informants in this study suggested consulting with a colleague rather than a digital knowledge resource for answers to questions at hand. This points to the strength of collective expertise held by a community of practice [3].

The informants suggested that the tool might be more useful and helpful for introduction to the work as scop-watch. This points to some interesting discussions from a competency development perspective about scope, purpose and content in web-based resources, and what roles, potentialities and use could be. Is the work that goes into scop-watch so complex and multifaceted that the established routines and practices only to a certain extent can be prepared for virtual environment?. We need to explore further how the design team reasoned and negotiated to select content, and how the chosen/given authoring tool and Learning Management System's functionalities gave direction for design choices. Simulating and practicing authentic tasks in a web-based learning environment was a strategy to re-introduce, keep up or even enforce important routines and responsibilities for the scop-watch. Emphasizing routines and skills can be important to reduce variation and ensure more streamlined practice. The emphasize in assignments and virtual "simulations" and the tool's structuring role to enforce routines for early detection and treatment as nurses' contributions to patient safety [14].

The resource, "*skopvaktfunksjonen*" is part of a comprehensive, modular competency development program. In this particular case, the hospital is currently considering the sequencing, and they suggest that the users are exposed to the web-based learning environment as an introduction to this particular work. In addition, the module-*ischemia monitoring* - is a compulsory part of the introduction program for new staff, agency nurses, part-timers and substitutes. In addition to introduction of the work, the web-based learning environment will also be used for certification and re-certification. This opens new and dynamic opportunities to use and re-use the constructed artifacts.

6. Conclusion

In this paper we have reported on the design of and pilot users' feedback about a web-based learning environment. This gives insight to affordances of a web-based tool, and how content is represented in the learning environment. From a competency development perspective, this relates to mastery of concrete skills and construction of knowledge considered valid for the scop-function by the RNs, and by the hospitals. Practicing authentic tasks in a web-based learning environment was seen as useful to train skills and keep up important routines. This approach needs careful consideration to understand knowledge construction processes and ongoing transformations in clinical practice over time. How the exploitation of how web-based tools can support learning in work contexts and play out towards the individual's overall professional development needs further careful studies.

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