Evaluation of the further training “Beratende für digitale Gesundheitsversorgung” (“Consultant for Digital Healthcare”): Protocol for an effectiveness study

Bernhard Kraft, Thomas Kuscher, Susann Zawatzki, Sebastian Hofstetter, Patrick Jahn

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Bernhard Kraft[1, 2]; Thomas Kuscher[1]; Susann Zawatzki[1]; Sebastian Hofstetter[1, 3]; Patrick Jahn[1]

[1]Health Service Research Working Group | Acute Care Faculty of Medicine Martin Luther University Halle-Wittenberg Halle (Saale) DE
[2]Institute for History and Ethics of Medicine Faculty of Medicine Martin Luther University Halle-Wittenberg Halle (Saale) DE
[3]Dorothea Erxleben Lernzentrum Halle (DELH) Faculty of Medicine Martin Luther University Halle-Wittenberg Halle (Saale) DE

Corresponding Author:
Bernhard Kraft
Health Service Research Working Group | Acute Care
Faculty of Medicine
Martin Luther University Halle-Wittenberg
Ernst-Grube-str. 40
Halle (Saale)
DE

Abstract

Background: The digital transformation in healthcare requires training nursing and health professionals in the digitally competent use of digital-assistive technologies (DAT). The further educational training “Beratende für digitale Gesundheitsversorgung” (“Consultant for Digital Healthcare”) was developed to fill this gap. The effectiveness of the training program will be assessed by this study.

Objective: The primary objective is to record and measure the learning success of the participants. It is assessed whether the previously defined teaching intentions, learning objectives, competencies, expectations of the participants have been achieved and whether there has been a transfer of learning. The secondary objective is the satisfaction of the participants and the feasibility of the training. The tertiary objective is the transfer success of the participants of DAT in the institutions.

Methods: Approximately 65 nursing and health care professionals will participate in the piloting phase of the further training and take part in the evaluation process, which is planned in a mixed-method design. It is planned to conduct pre-post surveys in the form of self-assessments of the participants in dealing with DAT as well as on content-related knowledge levels. In addition, exploratory individual interviews will be conducted to build theory. Here, it will be examined whether and to what extent an increase in competence (cognition) has taken place and whether a change in dealing (affect) with DAT has occurred. Furthermore, there will be an interim evaluation within the framework of the Teaching Analysis Poll (TAP). The knowledge thereby gained will then be used to revise and adapt the modules for future courses. To assess the transfer success the participants create a practical project, which is carried out within the framework of the training, observed by the lecturers and subsequently evaluated and adapted.

Results: It is to be expected that the learning objectives aimed for through the further training will be met. The attendees are expected to increase their level of digital competence along different skills areas. First, concerning their theoretical knowledge, second, concerning their hand-on skills planning the application and practical usage of DAT, third, their reflective skills, applying ethical and legal considerations in their usage, forth, to apply all that in a structured process of technology implementation within their practical sphere of work.

Conclusions: The aim of this study and the appropriate further training program is to educate nursing and health care professionals in the use of DAT and thereby empower them for a structured change process towards a digitally aided care. This focus gives rise to following research question associated by it. First, how do further training programs need to be developed and which focus is appropriate for addressee-appropriate learning goals, course structure and the general curriculum. Second, how should a training program with this specific content and area be evaluated? And thirdly, what are the conditions for a continued program offer?

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Authors

Bernhard Kraft[1,2], Thomas Kuscher[1], Susann Zawatzki[1], Sebastian Hofstetter[2,3], Patrick Jahn[1]

[1] University Medicine Halle (Saale), Health Service Research Working Group | Acute Care, Department of Internal Medicine, Faculty of Medicine Martin Luther University Halle-Wittenberg, Ernst-Grube-Str. 40, 06120 Halle (Saale), Germany

[2] Faculty of Medicine, Martin Luther University Halle-Wittenberg, Institute for History and Ethics of Medicine, Interdisciplinary Center for Health Sciences, Magdeburger Straße 8, 06112 Halle (Saale), Germany

[3] Faculty of Medicine, Martin Luther University Halle-Wittenberg, Dorothea Erxleben Lernzentrum Halle (DELH), Magdeburger Straße 12, 06112 Halle (Saale), Germany

Corresponding Author:

Bernhard Kraft, M.A.

University Medicine Halle (Saale), Health Service Research Working Group | Acute Care, Department of Internal Medicine, Faculty of Medicine Martin-Luther-University Halle-Wittenberg, Ernst-Grube-Str. 40, 06120 Halle (Saale), Germany

Telefon: +49 345 55 74 149

E-Mail: bernhard.kraft@uk-halle.de

ORCID-iD:

Sebastian Hofstetter	0000-0003-3110-2379
Bernhard Kraft	0000-0001-9090-2611
Patrick Jahn	0000-0002-1533-6717

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Conflict of interest

The authors have no conflicts of interest.

Ethical Disclosure

An ethics approval was given for survey by the Ethics Committee of the Medical Faculty of the Martin Luther University Halle-Wittenberg (processing number: 2023-143 21 06 23).

Abstract

Background: The digital transformation in healthcare requires training nursing and health professionals in the digitally competent use of digital-assistive technologies (DAT). The further educational training “Beratende für digitale Gesundheitsversorgung” (“Consultant for Digital Healthcare”) was developed to fill this gap. The effectiveness of the training program will be assessed by this study.

Objective: The primary objective is to record and measure the learning success of the participants. It is assessed whether the previously defined teaching intentions, learning objectives, competencies, expectations of the participants have been achieved and whether there has been a transfer of learning. The secondary objective is the satisfaction of the participants and the feasibility of the training. The tertiary objective is the transfer success of the participants of DAT in the institutions.

Methods: Approximately 65 nursing and health care professionals will participate in the piloting phase of the further training and take part in the evaluation process, which is planned in a mixed-methods design in a non-sequential manner. This means the different methods will be combined in the interpretation of the results to achieve a synaptic view on the training program. It is planned to conduct pre-post surveys in the form of self-assessments of the participants in dealing with DAT as well as on content-related knowledge levels. In addition, exploratory individual interviews will be conducted to build theory. Here, it will be examined whether and to what extent an increase in competence (cognition) has taken place and whether a change in dealing (affect) with DAT has occurred. Furthermore, there will be an interim evaluation within the framework of the Teaching Analysis Poll (TAP). The knowledge thereby gained will then be used to revise and adapt the modules for future courses. To assess the transfer success the participants create a practical project, which is carried out within the framework of the training, observed by the lecturers and subsequently evaluated and adapted.

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change process towards a digitally aided care. This focus gives rise to following research question associated by it. First, how do further training programs need to be developed and which focus is appropriate for addressee-appropriate learning goals, course structure and the general curriculum. Second, how should a training program with this specific content and area be evaluated? And thirdly, what are the conditions for a continued program offer?

Keywords: Digitization; digital-assistive technologies; nursing and health care professionals; further training program; digital competence

Introduction

The use of existing as well as the development of new and innovative digital-assistive technologies (DAT) offers great potential to meet both current and future challenges in care. DAT is a collective term for systems that are intended to support people in their diverse tasks with the aim of promoting independence and self-sufficiency, expanding one's own abilities and promoting well-being [1,2]. As well as improve their quality of life when used in a planned and problem-oriented manner [3,4]. Furthermore, DAT are discussed as a useful support for caregivers by using them as additional resources of health-care provision. Used correctly, they create relief opportunities and also strengthen the willingness of family members to provide care [5,6]. In the sense of "on-site" assistance, DAT can thus increase the radius of action of people in their environment. The OECD's ageing-in-place approach is authoritative in this regard [7]. Consequently, health professionals can also benefit from the acquisition of transformative competencies and the participatory acquisition of health-related technical knowledge.

The targeted and user-centered use of digital technologies in the healthcare sector can lead to an improvement in care and offers countless potentials. Health and care professionals can be supported and relieved in their daily work, and the recipient of health services can experience an increase in the quality of the service thanks to a technically supported offering, thereby improving their own quality of life [8,9].

Of course, there are also ethical, social, practical challenges, which need to be addressed concerning the usage and implementation of digital technologies in the healthcare sector. These are, for example, questions of acceptance, data protection, the corresponding integration into existing work processes or about refinance [10–16].

Since digitization in nursing care facilities has been comparatively underdeveloped to date, the sector is about to undergo a profound change [17–19]. Preparing the players involved for this and enabling

them to actively shape the transformation and contribute their professional expertise to the development, design and implementation of new technologies is a necessary educational task for the success of this process. The necessary competencies should be learned in practical, daily-use scenarios in order to be able to integrate the technologies and new processes confidently into nursing practice [20,21].

In order to familiarize healthcare and nursing staff systematically and broadly with the topic, it is necessary to anchor the teaching of digital competencies in education, training and continuing education [22]. The need and willingness to learn the practical use of DAT is strong among nursing trainees [23]. Nevertheless, these requirements have so far been insufficiently implemented in the framework curricula of the federal states and in the design of targeted continuing education programs in Germany [23,24].

Comparable continuing education offerings, such as the “Online Campus Pflege” or “Pflege 4.0,” mostly focus on simply teaching digital skills and have a relatively smaller number of hours, especially the face-to-face sessions [25–28]. In contrast to these offers, the further training “Consultant for Digital Healthcare” is characterized by a high level of application orientation, emphasizes an ethical and reflective skills transfer and, finally, accompanies and focuses on a practical project in which the implementation of digital technologies is supported in practice. In addition to imparting theoretical knowledge and practical application skills, the further training aims to have a direct influence on digital transformation and to demonstrate and accompany the successful theory-practice transfer with the resulting projects.

This research project would like to close the gap and pursue the research question of how digital competencies should be taught in an addressee-appropriate manner in the form of continuing education in order to enable professionals to become sovereign designers and multipliers of the digital transformation in healthcare and healthcare delivery. Therefore the further training program “Consultant for Digital Healthcare” shall be evaluated.

Methods

The study is planned as an exploratory intervention and feasibility study with follow-up survey. Through a mixed-method approach, the qualitative and quantitative survey methods used will be combined in a non-sequential design [29,30]. This means that the results of the individual parts should enable a better overall understanding of the research questions raised [30].

The aim of the study is to evaluate whether the further education program for "Consultants for Digital Healthcare" empowers nursing and healthcare professionals to shape the digital

transformation, specifically by serving as multipliers for transformation projects in various healthcare facilities. This is intended to promote the sustainable implementation of digital systems in practice. To achieve this, multipliers require diverse competencies, including not only technical expertise but also skills in guiding, advising, and training colleagues. The multiplier can be broadly considered a change agent. For this reason, digital competence is understood here as a cross-sectional skill that should enable a diverse and multidimensional approach to aspects of digital transformation.

To be able to evaluate the structure, learning objectives, and didactic methods of further education scientifically, they can be examined using a mixed-methods design. For this purpose, previously offered events were systematically reviewed through literature research and compared with existing theory (Project Format) on the development of digital competencies [12,17,31,32]. This comparison revealed that corresponding further education programs, which understand the conveyance of digital competency as a cross-sectional skill and thus aim for sustainable, connectable development, are underrepresented. Against this background, a blended learning concept is developed based on theoretical and evidence-based considerations that promote learning and practical transfer through action-guided instruction and aim to address the preceding research desideratum. The hypothesis underlying this is that the use and conveyance of specific assessment tools, action guides, and the practical design of training situations promote learning transfer.

The level of outcomes reflects the learning and success monitoring of the further education program. It is examined whether participants can build digital competencies in handling digital and assistive technologies and transfer them into practice. The structure primarily reflects the macro-didactic framework. This aims to assess whether the resources available and used for the learning situations were appropriate and effective. The process describes the course of the pilot phase and serves to monitor the success of implementation and the feasibility of the project.

The evaluation of learning success will be conducted quantitatively through a self-assessment questionnaire and item questions on participants' knowledge content. The questions relate to the two dimensions of cognition and affect in dealing with digital and assistive technologies, with cognition being the primary dimension reflected. It is assumed that these function similarly to attitudinal characteristics. The questionnaire was developed along various areas of action-oriented competence development in healthcare, such as areas of professional competence, social-communicative, ethical-reflective and general methodological competence. [33]. By promoting self-efficacy, either through the building of knowledge content or the reduction of barriers in dealing with DAT, transfer into practice as well as acceptance in usage can be promoted. For the qualitative assessment of the training by the participants, guided interviews will be utilized. The questions were developed using

the SPSS method [34]. These will be evaluated using a qualitative content analysis, according to Kuckartz [35]. Deductively derived categories from theory will be examined using a coding system and checked for fit. Furthermore, the coding allows for the formation of inductive categories to identify further codes, which is intended to promote theory-building and examination in the field of digital competencies.

Another tool consists of standardized questionnaires to evaluate specific training situations. These assess various dimensions of the teaching situation, including spatial setup, lecturer skills, and atmosphere.

Additionally, through a practical project of the participants and associated observation of the lecturers in terms of open observation, a behavioral dimension of the participants in dealing with DAT becomes visible, and is documented by the lecturers using observation sheets. Further education thus provides the opportunity not only to assess acquired competencies in closed training settings but also directly with the participants and to reflect on them finally.

Three measurement points are planned for the study. The first measurement point (t1) occurs before direct participation. Here, self-assessment questionnaires and the participants' knowledge of dealing with DAT are recorded. The second measurement point occurs at the halfway mark of the respective conducted modules (t2). At this point, the first revision of the modules is made using the TAP. The third measurement point is taken after the completion of further education (t3). Here, the self-assessment questionnaires or knowledge levels in dealing with DAT are recorded again. Furthermore, at this point, the qualitative individual interviews are conducted. Since participants are not subject to strict scheduling due to the modular structure, there are no scheduled dates but individual measurement points for the participants.

The target group and prerequisite for further training is basic vocational training in nursing and health professions. With this target group in mind, the training is designed according to the DQR with a requirement level of level 4 [36]. In addition, there are no specific requirements for participation in further training.

The participants in the study were informed about the various survey instruments and gave their consent. The data is stored on an access-restricted cloud and evaluated and analyzed in an anonymized form and is therefore GDPR compliant.**Description of the intervention: Further education to become a “Consultant for Digital Healthcare” (“Beratende für digitale Gesundheitsversorgung”)**

In order to enable healthcare professionals to deal confidently with digital technologies and to help shape the digital transformation, the further training measure to become a “Consultant for Digital

Healthcare” ("Beratende für digitale Gesundheitsversorgung") was funded by the Saxony-Anhalt Ministry of Labor, Social Affairs, Health and Equality. The novel training is currently in the pilot and development phase under the direction of the AG Versorgungsforschung | Pflege im Krankenhaus and the Dorothea Erxleben Learning Center of the Medical Faculty of Martin Luther University Halle-Wittenberg. The addressees of the training are health and nursing professionals primarily from the federal state of Saxony-Anhalt. For the pilot phase, approximately 65 participants are registered, who will go through a modularized curriculum with a workload of 200 teaching units and five days of classroom training over a period of nine months.

On the one hand, the further training is characterized by a strong application orientation which, in addition to theoretical introductions to technical, legal and financial aspects of digitization, focuses in particular on practical familiarization with and experience of new technologies and the promotion of facility-related digitization projects, thus advancing theory-practice transfer and the training of competent multipliers. On the other hand, a special focus is placed on the training of ethical-reflective competencies in order to learn to ethically assess the integration of digital assistance systems into the care process and possible consequences of increasing digitization.

The designed self-study and preparation phase initiates learning content in the preparation of the attendance days and familiarize the participants with the first contents. In the follow-up phase, extensive tasks are designed to ensure sustainable results and learning transfer.

The training is divided into three modules:

Module I: Fundamentals of digital transformation and its relevance for the nursing professions	1.1 Raising awareness and introducing digital healthcare 1.2 ePA, DiPA, DiGA and co. 1.3 Ethical and legal aspects as a prerequisite for digital transformation
Module II: Digital transformation in a value-oriented and professional manner in professional practice	2.1 Supply process integration and scenario-based reflection on digital assistive technologies 2.2 Evidence-based digital transformation – Fundamentals of evidence-based work in the context of digital transformation 2.3 Practical application based on the SEQI-process (Sensitization, Evaluative Introduction, Qualification, Implementation) – incl. practical support

Module III: Promoting personal development	3.1 Basics of Project Management, Moderation Methods, Creative Methods 3.2 Project work on digital transformation at the facility

Table 1: Overview of the three modules of the further training program

The following learning goals are set to achieve by the further training program. They were selected based on existing overviews of the necessary acquisition of skills in the area of digital health care [25]:

Learners acquire basic knowledge of the digital transformation of healthcare
The learners are sensitized to the need to acquire skills for digital transformation in the context of healthcare and know its importance for cross-sector care
Learners develop a reflective attitude towards digital and assistive technologies
The learners know the background and objectives of digital health applications
Learners assess the relevance of digital health applications in relation to the professional context
Learners can identify, analyze, reflect on and solve ethical problems by getting to know various ethical theories and models and using practical case studies to demonstrate how to systematically work on and think through an ethical problem
Learners know the meaning of ethics in the context of their profession by becoming familiar with the codes, guidelines and profession-specific guidelines that express this connection
Learners can evaluate individual digital assistance technologies ethically by getting to know models for the ethical evaluation of digital assistance technologies
Learners can transfer theoretical knowledge into their professional practice by learning the practical use of various technologies and being able to discuss and reflect based on scenarios
Learners can critically reflect on the opportunities and risks of using DAT as an additional resource for nursing process planning by testing this with the help of case vignettes

Table 2: Selected learning goals of the further training prgram

Study population

All participants in the continuing education program for "digital healthcare consultants" are eligible for inclusion in the study. The target group for participation is fundamentally trained nursing and healthcare professionals. Since the training is funded by the state of Saxony-Anhalt, participation is also primarily offered to professionals from Saxony-Anhalt. Due to the high demand also from

outside Saxony-Anhalt, a quota system will be applied for applicants from other federal states as long as there are still free places available.

Inclusion criteria:

- Health Professionals: Nurse Practitioner, Health Care Nurse, Nursing Specialist, Pediatric Nurse Practitioner, Health and Pediatric Nurse Practitioner, Geriatric nurse, Surgical Technologist Assistant, Anesthesia Technician Assistant, Emergency Paramedic, Midwife and maternity nurse, Physiotherapist & Occupational Therapist.
- Minimum age 18 years
- Sufficient knowledge of written and spoken German

Exclusion Criteria:

- Lack of knowledge of the German language
- Lack of capacity to consent

Quantitative study

With the “Reflection sheet for recording the competencies of a nurse” questionnaire for recording the digital competencies of a nurse and health care professionals, the self-assessments of the participants regarding their professional competencies, social-communicative, ethical-reflective competencies and methodological competencies are queried on a 5 level Likert scale. This takes place in the sense of a pre-post comparison once at the beginning of the training (t1) and once after completion of the training (t3). The questionnaire will be completed online and made available via Ilias one month before the start of the training. Participants are encouraged to complete the questionnaire as fully as possible. The questionnaire for self-assessment records the subjective feeling of competence of the participants in the areas with the corresponding questions for self-assessment:

1. Expertise	a) Knowledge of digital technologies (DAT) and their classification options b) Knowledge of the possible uses of DAT c) Technically correct preparation, implementation and follow-up of the DAT d) Recognizing the client's individual care needs e) Knowledge of how to use DAT f) Knowledge of SEQI as a structured implementation model g) Applying SEQI as a structured implementation model

	h) Knowledge of the legal basis of DAT
2. Social-communicative competence	a. Knowledge of psychological, pedagogical, sociological and communicative basics within project work b. Client-appropriate communication and empathy c. Recognize and respond to non-verbal signals d. Carrying out advice, guidance and training e. Knowledge of different models of (joint) decision making Ability to cooperate and work in a team
3. Ethical-reflexive competence	a) Knowledge of ethical theories and models b) Knowledge of the importance of ethics in the context of nursing c) Identification of an ethical problem d) Analyzing an ethical problem e) Justify your own actions ethically f) Ethical assessment of individual DAT g) Knowledge of models for the ethical assessment of DAT h) Application of models for the ethical assessment of DAT i) Reflected deployment or reflected deployment planning of DAT
4. Methodological competence	a) Knowledge of scientific research b) Conducting scientific research c) Organization and coordination of work processes d) Presentation techniques e) Selection and use of assessment instruments

Table 3: Reflection sheet to record the competencies of a nursing staff in the pre-post assessment

Furthermore, the knowledge levels of the participants are recorded before the start of the modules in order to make possible learning gains visible. This also takes place in the sense of a pre-post comparison using single-choice, multiple-choice, open and closed questions.

Qualitative study

One serie of interviews is planned to qualitatively assess the learning success of the participants and to evaluate the overall design of the further training. A total number of approximately 10 interviews is planned. The selection of inquiries will take place according to the principle of convenience

sampling; the achievement of statistical representativeness is not envisaged (Zwick and Schröter 2012).

By means of the interview guide, the survey is carried out with the clear aim of retrieving specific knowledge necessary to answer the precise and theoretically embedded research question. Accordingly, the interviews conducted after the completion of the training deal with the following questions or main topics:

1. Learning success of the participants (different competencies)
2. Satisfaction of the participants with the course and contents of the training
3. Transfer success through the project work in the facilities

Thus, the quantitative assessments of the participants in the training are supplemented and explained by the interviews. The methodological recourse to expert interviews for data collection results from the fact that conducting expert interviews already presupposes a good knowledge of the field of investigation, which is guaranteed by the target group. In the expert interviews, the focus is on narrative elements relating to the ideas of a meaningful training concept. The guidelines were developed iteratively using the SPSS method according to [37]. The methodical preparation is developed in the sense of the mechanism-exploring research paradigm of qualitative content analysis according to [38].

Teaching Analysis Poll (TAP)

TAP is a method for the interim evaluation of teaching units, in which a group discussion takes place with the participants in the absence of the teacher. The evaluation is moderated by uninvolved staff members. The participants first discuss the following three questions in small groups:

1. What do you learn most from in this event?
2. What makes your learning difficult?
3. What suggestions for improvement do you have for points perceived as obstructive?

The answers from the groups are discussed in plenary, unclear answers are clarified, and the results are checked for their majority ability. A summary of the majority-acceptable results is sent to the teachers in a feedback meeting, which should take place promptly after the TAP. Ideas are jointly developed on how to implement the participants' suggestions for modifying the content. Subsequently, the teacher discusses with the participants how the training can be modified, if necessary, during the training event and who can contribute to this and how. The goal is to provide feedback for teachers, stimulate reflection and exchange about teaching and learning in the professional development event.

Open questions in the questionnaire survey

The qualitative part of the quantitative preliminary survey includes two open-ended questions:

1. What are your expectations for continuing education?
2. What difficulties might arise with regard to continuing education?

Results

Data will be collected at the beginning, in the course of and at the end of the further training program. The program runs from September 2023 until July 2024. In the course of this period, there will be several data points. This study will evaluate the learning outcome of the further training program. A change in digital competences in the pre-post comparison is expected. To further investigate the reasons for the expected change 10 expert interviews will be conducted to generate a structured feedback by the participants. It is to be expected that the learning objectives aimed for through the further training will be met. The attendees are expected to increase their level of digital competence along different skills areas. First, concerning their theoretical knowledge, second, concerning their hand-on skills planning the application and practical usage of DAT, third, their reflective skills, applying ethical and legal considerations in their usage, and forth, to apply all that in a structured process of technology implementation within their practical sphere of work.

Discussion

This pilot study will evaluate a new training program for nurses and allied health services workers to become “Consultant for Digital Healthcare”. The aim of this study and the appropriate further training program is to educate nursing and health care professionals in the use of DAT. As a result, it is expected that the digital skills of the participants will increase in accordance with the survey instrument used. In addition, the structure and content of the further training will be analyzed and evaluated in a differentiated manner so that targeted adjustments can be made for further runs. This focus gives rise to following research questions associated by it: First, how do further training programs need to be developed and which focus is appropriate for addressee-appropriate learning goals, course structure and the general curriculum. Second, which digital competences do the individuals in question require? Third, how should a training program with this specific content and area be evaluated? And forth, what are the conditions for a continued program offer?

In particular, it is expected that the participants will have acquired new knowledge and can apply it in practice. This application focus will be promoted in particular through the project work. The social form of group work and informal exchange between participants is also expected to be crucial for learning success. The special orientation of the further training, with a high level of application relevance, will play a decisive role in preparing the participants for the dynamic and project-related

digital transformation of health care [20,21].

This builds on previous research work. These were initially aimed at assessing the needs for digital skills in nursing. A structured training process for the introduction of digital technologies in the facilities was then piloted and evaluated [21]. Ultimately, this preparatory work will be made accessible to a large number of skilled workers in a wide area through further training and converted into a continuous educational program.

The special feature of further training is that it addresses a heterogeneous target group, with many different professional groups from health care, extending from the operational level to the management level. In addition, the aim is to cover as wide a range of technologies in order to provide an overview, but also to provide participants with a selection of possible technologies for their own practical project.

The study assessing continuing education has some limitations. On the one hand, only methods of subjective self-assessment of the participants are used, which is subject to bias and misjudgment. This point needs to be carefully considered during the evaluation of the results. Furthermore, the piloting phase of the further training program is rather short term, which is a necessary prerequisite for further development and a first evaluation of the results and the effects of the training on the development of digital competences of the participants. As for the project within the context of the training program, they are accompanied by the contents and team of the study, but need to be developed and implemented with further stakeholders and companies in the real-world as a so called living-lab environment. This implies levels of complexities which cannot be fully controlled by the training program, but still be guided and prepared. The sample size of 65 participants is rather small, but for a first piloting phase big enough for first evaluation and interferences on appropriate training methods for allied health care workers.

Looking at the results in a broader context, it is important to note that there is still a long way to go to targeted digitally supported health care, for which targeted training and further education is a keystone and is promoted by the program outlined. General standards for those trainings should be outlined and accepted on a political level. Furthermore, new technologies must also be developed explicitly for nursing care, with the explicit participation of specialists to address the specific needs of the sector.

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Supplementary Files