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Review Article

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# Ongoing Training Mediated by Technologies in Primary Health Care: Systematic Review

## Formação Permanente Mediada por Tecnologias na Atenção Primária em Saúde: Revisão Sistemática

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**Abstract**
**Introduction:** Increasingly, allied technology or in fact has shown itself to be significant in the development of new learning approaches. For health professionals, or permanent education, it is a relevant transforming factor, both at the collective level and in the community. The **objective** of this study is to identify learning models mediated by digital technologies aimed at their application in primary health care, aiming at permanent education. **Materials and Methods:** To this end, a systematic survey was carried out on the topic in the scientific literature databases SCOPUS, IEEE Explore Digital Library, Google Academic, CAPES Periodicals, including studies published between 2010 and 2020. To build the process, the Petersen, Vakkalanka and Kuzniarz method was applied, the search was carried out in the research bases involving the main themes, namely: Technology; Learning Model; Permanent Health Education and Primary Health Care, and their derivations. **Results:** The first search identify 663 articles, the critical analysis will restore about 2 articles, using a technique called snowball, more than one article was found, therefore consisting of 3 articles as the results of this research. **Conclusion:** From the analysis of the identification of the deficit of publications with this theme, specifically in primary care. As limitations, it verifies some obstacles, both in the search string and in the established bases.
**Keywords:** Teaching method. Training. Permanent Education in Health.

**Resumo**
**Introdução:** Cada vez mais a tecnologia aliada ao ensino tem demonstrado ganhos significativos no desenvolvimento de novas abordagens para aprendizagem. Para os profissionais da saúde, o ensino continuado é um relevante fator transformador, tanto em esferas coletivas quanto na comunidade. O **objetivo** deste estudo é identificar modelos de aprendizagem mediados por tecnologias digitais voltados à atenção primária em saúde visando a educação permanente. **Materiais e Métodos:** Para tanto, um levantamento sistemático sobre o tema foi realizado nas bases de dados de literatura científica SCOPUS, IEEE *Explore Digital Library*, Google Acadêmico, Periódicos CAPES, incluindo estudos publicados entre o 2010 ao 2020. Para a construção do processo, foi aplicado o método proposto por Petersen, Vakkalanka e Kuzniarz, realizando-se a busca nas bases de pesquisa envolvendo os principais temas, sendo eles: Tecnologia; Modelo de Aprendizagem; Educação Permanente em Saúde e Atenção

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Primária em Saúde, e suas derivações. **Resultados:** Na primeira busca identificou 663 artigos, após análise crítica considerando o objetivo do estudo restaram 2 artigos. Devido a este resultado utilizou-se a técnica s*nowball*, onde foi encontrado mais um artigo, compondo, portanto, 3 artigos como resultados desta pesquisa. **Conclusão:** A partir da análise identificou-se carência de trabalhos envolvendo modelos de aprendizagem permanente voltadas a atenção primária, especificamente mediadas por tecnologias digitais. Como limitações verificou-se alguns obstáculos, tanto na s*tring* de busca quanto na busca nas bases escolhidas.
**Palavras-chave:** Método de ensino. Capacitação. Educação Permanente em Saúde.

## Introduction

Developing permanent education, through qualifications and training, requires thinking about innovative proposals, where learning experiences must instigate the involved people, creating links between the knowledge creation and the understanding processes. The performed processes must transform the professional environment and strengthen the personal growth. The autonomy in learning strengthens the subject's ability to learn and his awareness of the need for permanent education[2]. Therefore, new learning methods and techniques were created to direct the student learning towards learning through problem resolution. There is developed studies from the active learning methods, through the technology insertion, to more autonomous proposals, focused on meaningful learning.

Aiming at permanent education for health professionals, the President of the Republic instituted the Decree 7.385, of December 8th, 2010, creating the UNA-SUS to meet the training and continuing education needs of workers in the Unified Health System - SUS, through the development of a distance education modality in the health area. With the UNA-SUS creation, several qualifications were created to improve the healthcare and to meet its needs[3].

The primary healthcare (PHC) can be defined as a patient first contact service, a first-level outpatient care for the public health system, aimed at the promotion and prevention of harm to a population[4]. It is also possible to identify three lines of thought to the usage of the term PHC: the first, as a selective and focused program, where there is a restricted services set; the second, confirms that it can be classified as a healthcare level, which professionals actions, services and its objective are directed to the whole population; and the third, that proposes that the term PHC can be used as a comprehensive form, bringing a conception with a healthcare and organization model of the health system[4].

The professional that works in this area needs constant qualifications and updates in her/his working practice. Therefore, the health secretaries, in a partnership with the federal government, have the goal of carrying out a project with an annual plan that aims to critically reflect on training, management and care practices, being it itself an educational process applied to work. This enables changes in relationships, in processes, in health actions and in people, and a better articulation inside and outside of the institutions. To support the planning process, the proposed guideline to subsidize states/municipalities and the Federal District, called PEPS (Permanent Health Education Plan) arose, which is a guide for managers to propose formulations, organizations and actions of health professionals' permanent education, both in PHCs and in hospitals[5].

The subject's belonging and inclusion, as a being inserted in a contemporaneous society, presupposes a usage of technologies inside a digital literacy perspective[6]. This concept needs to be inserted in the formation process of health professionals with the technology use. In an article about the method of

literature integrate review, mobile applications developed for the health area in Brazil were researched. Among the researched applications, several knowledge areas were found, including the area of Nursing, Dentistry and Medicine. The technologies that register vital signals of patients for follow-up, a vaccines follow-up mobile application, and an image processing technology stood out. It was found that of the technologies found in this review article, there is no exposure of training or qualification technologies for health professionals in primary health attention and hospital areas[7].

Hence, the development of formation processes of first health care professionals with technology is an open research topic and an important investigation field. Thus, the objective of this study was to identify the learning models through digital technologies aimed to first health care application aimed to permanent education, in order to identify the guidelines/elements of a permanent formation process of first health care professionals. 663 works were analyzed, and 2 among them stood out through the proposed method and 1 stood out through a second method, named snowball, that was necessary due to the number of articles found out in the data base. The results found demonstrated the existence of a knowledge gap, that must be worked on for the improvement and quality of the provided services in first care health.

## Materials and Methods

This work is organized in six sections. In addition to the introduction, this section presents the materials and methods used for the construction and elaboration of the results, the section three presents the results found based on the research questions and the section four presents a discussion between the found-out results. In the section five, there is explanations about the limitations [4]worked in the researches, followed by the work final considerations.

### Sample and Study Type

This is a literature systematic review study, built according the guidelines proposed by Petersen, Vakkalanka and Kuzniarz[1]. To identify articles about the topic, a search in the data bases SCOPUS, IEEE Explore Digital Library, Academic Google, CAPES Periodicals was performed. This search was performed starting from a search string in the Portuguese and English versions, involving the main topics, that are: Technology; Learning Models; First Health Care and Health Permanent Education, and their variations.

### Study Model

The study was guided by the following guidelines suggested by Petersen, Vakkalanka and Kuzniarz[1]:

(A) Define the research question: present the investigated research questions;
(B) Define the search process: outline the strategy and the library that were explored to collection;
(C) Define the results filter criteria: explain the study selection criteria;
(D) Execute the analyses and classify the results: compare the selected results and the research questions.

### Research outline

[4] SCOPUS - Avaiable in: https://www.scopus.com/
[5] IEEE Explore Digital Library – Avaiable in: https://ieeexplore.ieee.org/
[6] GOOGLE SCHOLAR – Avaiable in: https://scholar.google.com.br/
[7] CAPES Periodicals - Avaiable in: https://www-periodicos-capes-gov-br

The research questions were articulated considering this general study objective, that is, identify learning models applied to first health care aiming a permanent education and considering the usage of digital technologies. Therefore, the General Questions (GQ) and Specific Questions (SQ) was established:

1. GQ - What is the theoretical and epistemological base for permanent education learning models?
2. GQ - What are the open questions and challenges in health permanent education?
3. GQ - What are the established relationships with the local and national public politics, aimed to primary care area?
4. SQ - What are the main digital technologies used for strategies development in permanent education?
5. SQ - What are the learning strategy permanent training building stages?
6. SQ - What are the permanent training process stages?

**Search process**

At this stage, the research keywords and the research scope were outlined, depending on its objective. In the first, the keywords of interest were identified. With the idea of getting a search with accurate results, the keywords were grouped together with their synonyms to formulate the research sequence. In the second, we used PICO (Population, Intervention, Comparison and Results), suggested by Kitchenham and Charters[8] to formulate the research sequence starting from the research questions, which means:

- **Population:** the population, which involves related terms and keywords. In this case, the variants related to continued learning;
- **Intervention:** since the expression "continued learning" is a general term, we used the following terms to better define the studies according to the objectives: health formation, health permanent education and learning through life. With them, we can filter the health area studies, being this area an important part of our objectives;
- **Comparation:** this research compares different learning technological models applied to primary health care that aims the continued education;
- **Results:** this stage determines which results are relevant to answer the research question, amplify and improve the knowledge about easy access and interactivity health, and keep and instigate the continuity education in the first health area. Therefore, we defined as results the different technologies applied in continued learning models in the primary care área.

To perform searches in the data bases, and in order to cover studies in the area and even those in which the terms distance themselves through variations, the final search string, in Portuguese and English versions, inserted in the search engines are presented in the Table 1:

Table 1. Applied Search String

| Portuguese Version | English Version |
|---|---|
| *("tecnologia"* AND *("modelo de aprendizagem"* OR *"prática pedagógica"* OR *"método de ensino")* AND *("formação em saúde"* OR *"educação permanente em saúde"* OR *"aprendizagem ao longo da vida")* AND *("atenção primária à saúde"* OR *"atenção básica")).* | ("technology" AND ("learning model" OR "pedagogical practice" OR "teaching method") AND ("health training" OR "permanent health education" OR "lifelong learning") AND ("primary health care" OR "basic attention")). |

Source: elaborated by the authors, based in the research database (2020)

The string was applied in five data bases: SCOPUS, IEEE Explore Digital Library, Google Scholar, CAPES Periodicals. The results included publications from 2010 to 2020. PubMed is the data base that stands out as literary base in health context, but it did not bring any new result for this research. Thus, it was excluded of the next stages.

**Inclusion and Exclusion Criteria**

The next step was to filter the studies to qualify the results to the main objectives, defining the inclusion criteria (IC) and exclusion criteria (EC) based on the research question:

**Inclusion Criteria:**

1. The article must be written in English or Portuguese;
2. It must be a scientifical article, published in journals, congresses or magazines;
3. Publications between 2010 and 2020;
4. Only primary studies.

**Exclusion Criteria**

1. Articles written in other languages than English or Portuguese;
2. Be in duplicate in search engines, where the article with the earliest publication date was chosen;
3. The article does not include "learning model" neither its synonyms;
4. The article does not include "primary health care" neither its synonyms;
5. Publications characterized as thesis and dissertations, such as articles not published in journals, congresses and magazines;
6. The article does not include "technology".

**Quality criteria**

Quality criteria form an important stage in the selection. They are used to verify if the selected article is a relevant study and, through a text filter, if they are complete. We used the questions proposed by Roehrs[9].

1. Does the article clearly show the research proposal?
2. Does the article appropriately describe the literature review, historic or context?
3. Does the article present the related work about the main contribution?
4. Does the article propose a model or methodology of described research?
5. Does the article present research results?
6. Does the article present any conclusion related to the research objectives?
7. Does the article recommend future works, improvements or additional studies?

For the execution of the criteria, the maximum grade was 7 and the minimal

approval grade 5, and the answers could be "Yes", "Partially" and "No". The answer yes was worth 1 point, the partially was 0,5 point and the no answer gave no points.

**Procedures**

After elaborating the search string, the articles selection started, through the data base. The filter by period was applied, followed of the material exportation and cataloging. After that, it was applied to the stages of selection, evaluation, analysis, interpretation and presentation of the found data.

The Table 2 presents the selected articles quantity for each data base after the publication year filter, totalizing 663.

Table 2. Selected articles quantity after the data base filter.

| Data Base | SCOPUS | IEEE Explore Digital Library | Google Scholar | Capes Periodicals |
|---|---|---|---|---|
| Quantity | 8 | 421 | 207 | 27 |

Source: elaborated by the authors, based in the researched data (2020)

In the second stage, the 663 articles were organized and spreadsheet using the tool Parsif al[8]. This tool allowed the initial reading and analysis of the articles' essence, through the title and the abstract, such as identify and exclude registers that was not in accordance with the inclusion criteria of this review, such as duplicated articles and those that presented only the abstract. Hence, after this screening, 657 articles were excluded, resulting in 6 works in the end.

To conduct the systematic review, the PRISMA model was used, dividing the research in four macro stages, that are: Identifying, Screening, Eligibility and Included/Accepted.

In the first excluding process, the duplicated studies in the data bases were removed, totalizing 6 articles. Thus, in the remaining 657 articles, the inclusion and exclusion criteria were applied, resulting in six selected articles to complete analysis and reading.

In the following stage, the 6 articles were fully assessed for eligibility. At this stage, the quality criteria application was performed, resulting in the exclusion of four articles that were not in accordance with the research objectives. Thus, two articles remained from the research results: the ones written by Francis[10] and Yadav[11]. Francis'[10] article received five points because it did not bring indications for future works in its results and partially brought results about research and works related to the main contribution. Yadav's[11] work had the maximum score (seven), meeting all the qualities criteria requirements.

Due to the remaining work results, the snowball[12] technique was applied, as a complementary method to search for the data base. In the chosen procedure, the classified articles references were used to research additional publications, that can be lost in the data bank research. Each reference found in the initial set list that meets the specified inclusion and exclusion criteria was added to a new set of articles and a new iteration is made to find any references that could be included in the following stage. This process was performed until all the inclusion and exclusion criteria were applied.

The snowball technique considered as candidates the references of the final articles selection starting from the data base search, with the reference publication year, title and type verification (dissertation, resume, thesis, article, book). For articles considered potential candidates for later analyses, the reading of their abstracts was considered, and if they should go for

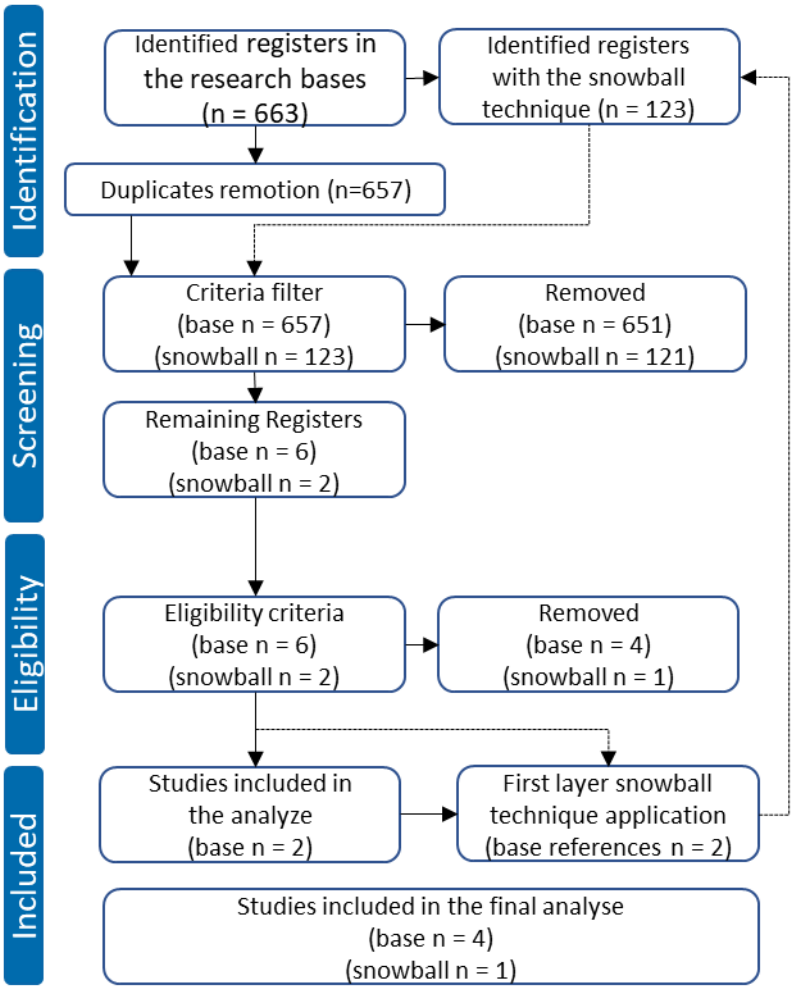
[8] *Parsif al* – Avaiable in: https://parsif.al/

inclusion in the new set of articles, then the full article was read.

The snowball technique results selected one more article, resulting in a total of three analyzed articles in this research. In this last article, the quality criteria were applied respecting the questions defined by Roehrs[9], thus it received the grade seven, meeting all the quality criteria.

The resulting iterations from the selection procedure are describer later in the section Results and exemplified in the presented process in the Figure 1, according to the protocol defined by Prisma Statement[13].

Figure 1 – Articles selection process flowchart.




Source: adapted[13] Prisma Statement

The articles that composed the study are synthesized in the synoptic table (Table 3), and the information about article title, authors, year and selected data base are highlighted. The articles are identified with numbers.

Table 3. Synoptic Table – Distribution of the Articles that composed this study.

| N | Article Title | Authors | Year | Data Base |
|---|---|---|---|---|
| 1 | *A regional approach to the education of nurse practitioner candidates to meet the health needs of rural Australians.* | Karen Francis; Michal Boyd; Heather Latham; Judith Anderson; Angela Bradley; Jan Manners. | 2015 | Google Scholar |
| 2 | *LEAP: Scaffolding Collaborative Learning of Community Health Workers in India.* | Deepika Yadav; Anushka Bhandary; Pushpendra Singh. | 2019 | Google Scholar |
| 3 | *Sangoshthi: Empowering Community Health Workers through Peer Learning in Rural India.* | Deepika Yadav; Pushpendra Singh; Kyle Montague; Vijay Kumar; Deepak Sood; Madeline Balaam; Drishti Sharma; Mona Duggal; Tom Bartindale; Delvin Varghese; Patrick Olivier. | 2017 | Snowball Method extracted from the article - Scaffolding Collaborative Learning Community Health Workers in India. |

Source: created by the authors, based in the research data (2020)

To ensure validity of this review, the selected studies were critically analyzed in detail, looking for explanations of the regularity opinions, inconsistencies between authors, and other important findings, such as the information patterns in the different studies. This analyze was discussed by this work authors in order to compose the discussions and results.

## Results

The results obtained through the research questions analysis are described below:

### 3.1 – GQ - What is the theoretical and epistemological base for permanent education learning models?

In the Yadav's article[14], a training platform based in a work proposed by Kazakos[15] was used. Then the Sangoshthi was created. It is a low-cost learning and qualification platform for Accredited Social Health Activists (ASHAs), with internet connectivity using low broadband.

In the case-control study, also proposed by Yadav[11], the Sangoshthi platform were improved, letting aside the vertical education focused in the instructor and proposing the autonomy and protagonism of the ASHAs in their own knowledge construction, through opportunities of discussions and interactions in pairs or independent groups, connected in the same platform.

In the Francis'[10] article, a cognitive learning educational model was used. In this educational model, the modelling, the coaching and the scaling are in the cognitive learning core and promote cognitive and metacognitive learning. It was proposed to develop a nursing program to prepare candidates for the practice in rural locations. The intervention was carried out due to the extreme need of capacitate health professionals who work especially in remote, rural and regional communities. The proposed model was worked in blended learning moments, using the technology as the environment, and a wellness and community engagement center for face-to-face classes and simulations with high-fidelity dummies.

### 3.2 - GQ - What are the open questions and challenges in health permanent education?

Yadav[14] brings in his article three important factors to be considered as challenges to the ASHAs and they are: transport, time and cost. The first considers the training place cost, the trainer fee, and the incentives for ASHAs to participate in the training. The time management is considered an important factor to discuss because each training session lasts around 6 to 7 daily hours. The ASHAs, in addition to their work, are overloaded with domestic tasks. The transport becomes a challenge, because some ASHAs leave in distant places, with irregular public transport schedule.

Another important point raised by the ASHAs was that the monthly meetings time would not be enough to resolve individual doubts. One of the main barriers to build mobile based learning platforms is the limited access to smartphones, since the environment does not have the needed resources to disseminate knowledge. During synchronous moments, there was problems with the smartphones usage, such as calls disconnections, this being a challenge for the mediators, once they had to reconnect the ASHA that lost the connectivity and ask patient for the other participants.

In the research where he tried to improve previous difficulties, Yadav[11] again found obstacles regarding the poor quality of internet connection and restricted access to smartphones. Another perceived challenge was the discussed topics and didactic material poor understanding, leading to confusion of the reasoning and themes with distinct focus during the discussions and interactions between the ASHAs. Through this, the importance to a better capacitation for the facilitators in the use of resources and strategies that support the understanding and exemplify in practical and didactical ways the theme to be discussed is evident.

Francis[10] says in his article that one of the points to be improved is access and equality in care, which is still being considered a big challenge to be improved by the government in all the levels. The planned approach will guarantee that the professionals are more prepared to deal with the barriers that they face in the health care.

### 3.3 - GQ - What are established relations with the local and national public politics, aimed to primary care area?

Yadav's[11,14] articles says that India government offer health services to the rural population through the National Rural Health Mission (HRHM). This identifies a literate woman in each village and qualifies her to be an ASHA, thus she has to cover an entire area with up to 1000 people[16].

One of the main functions of an ASHA is the health education to community members, promote the conscientization about health services, accompany pregnant women to the hospital for deliveries, make regular home visits for prenatal and puerperium, among other programs. The remuneration is paid by performance and each home visit generates a specific valor.

The standards established for clinical accreditation in Francis'[10] article were made based in the ANMAC[17]. In the ANMAC[17], the nursing program describes the focus on the community and not only in the exigence of the individuals professional experience. The professional experience as an education component in the nursing program have to allow the student to practice his knowledge in the patient care environment, with the needed clinical supervision level to develop skills and the usage of knowledge, consistent with what the function demands.

### 3.4 - SQ - What are the main digital technologies used for develop strategies in permanent education?

Yadav's[14] article used the IVR (Audible Response Unit) technology to amplify permanent education, hence the participants can participate in synchronous class through internet connected mobile devices, telephones and smartphones. In his

later research, Yadav used the same platform accessed by the ASHAs through mobile internet, proposing half-structured sections including a co-listening of a previously audio recorded didactic material and, in sequence, group discussions. In this one, students could access video classes at any moment to resolve their doubts.

Frances used, through university integration, a technology called Online Learning Environment (OLE), that allows the student to have access to send portfolios through a collection of new knowledge and teaching tools, including online meetings, discussion groups that engage students in an active and interactive learning. The OLE also works with students' diversity and recognize the time and limitation that students from remote and rural areas have.

### 3.5 - SQ - What are the learning strategy permanent training building stages?

Yadav[14] first identified the knowledge gaps to be worked. From this, a health NGO created ten topics on postpartum health at home. They randomly divided the 40 ASHAs in two groups. A control group and a treatment group. The treatment group received the intervention through the Sangoshthi tool, that was composed by 12 classes about 10 chosen topics in a 22 days period. The feedback about the Android application interface was obtained after each class to make it easier to use by the two groups.

Another case-control study implemented by Yadav[11] proposed to improve the Sangoshthi tool use strategy, starting from obstacles found in the previously intervention. From this, 120 ASHAs was divided in two big groups, with the first group formed by 58 ASHAs that did not receive any placebo method neither intervention other than their own routine. In the second group, 62 individuals formed six subgroups, with three groups in each of two health centers, with five to six ASHAs in each group. They received the intervention through the learning platform and interaction in groups, with synchronous, independent and online access.

Francis[10] first identified the importance of preparing nursing programs that will work with dynamic models to the clinical practice and to the access to healthcare by professionals, to increase the capacity of teams to serve the target population, which is an important focus of the course. The university's nursing students carried out a wide consultation in the community and with professionals. Some meetings were made with with Nursing directors and senior executives from public and private health services across the university. Through these meetings, the urgent need for nursing programs, especially for regional, rural and remote areas, to work with health professionals with a focus on achieving better health outcomes for the population was highlighted. Through these, the areas that need more urgent intervention were highlighted, namely PHC, mental health, indigenous health, chronic diseases, disease management, emergency and palliative care.

### 3.6 - SQ - What are the training permanent process stages?

Yadav[14] used two distinct segments to apply the program: the first, shorter, to provide summarized information about the topic, and the second for listener and expert interaction, with the longest segment being divided in several interaction rounds that the author calls Q&A. During the application of the class, the listener had only one opportunity to speak during a given round of questions and answers. Before a new topic, a new questions and answers round about the previous topic was applied.

To evaluate the continued formation impact, the expert elaborated an open questionary about the formation topics, and this questionary was applied before and after the classes to the control group and the treatment group. An improvement of 5% was identified in the responses of the control group and of 16% in the responses

of the treatment group. The control group improvement can be due to the knowledge sharing between the ASHAs from the treatment group control group. In the end, a as the last stage, the interviews and the classes were transcribed for the data analyses and, among them, the interviews with the ASHAS, with the experts, the moderators and the 12 teleconferences.

Based in his previous outline, Yadav[11] proposed in his virtual platform the synchronous access of pairs or small groups of ASHAs, without the need of an expert instructor teaching his knowledge in a hierarchical way. In this new proposed model, the authors incorporated an internet central system where it was possible to manage the platform including themes and topics, and registering the ASHAs that would be leaders – because of their skills in technology access and use – to manage groups and sessions schedule.

Moreover, through the management center, the participants interaction and performance monitoring were made. To the leader, all the material was previously provided, so he could access it in advance, preparing himself to mediate the discussions. After starting the videocall, the group received access to the didactic material, audio recorded and produced by the research partner NGO, about maternal and child health, lasting approximately 12 to 15 minutes. After that, they were still online and in synchrony, and received access to other two previously accessed audio records, that had an interview simulation where an ASHA made questions and an expert doctor answered. That audio records had short duration, 2-3 minutes. Between each audio, approximately 10 minutes were stipulated for group discussion, exchange of knowledge and experiences, notes of ideas and reflections, and the debate should be conducted by the leader. After the videocall, statistical data such as duration of debates, connected members and conversational activities were available on the management portal, and the next session could be scheduled later, notifying the new leader and participants of a new date, time and topic to be addressed. This study proposed 10 video calls sessions with distinct topics and, to evaluate the intervention in question of knowledge gains, a pre-post-test was applied with the aid of a questionnaire containing 20 open questions on the 10 covered topics. The questionary was elaborated by a pediatrician from the collaborating NGO, and responses were blindly assessed by two examiners who scored the questions according to the answer keys. After an analysis, the t test was used to verify statistical significance, showing benefits in terms of collaborative and interdependent learning carried out through debates and interpersonally among colleagues.

The course proposed by Francis[10] was built aiming at training in 96 credit points. First the students enrolled in a combination of 8 and 16 points, with the Blended Learning method, being it a combinate and flexible mode. The course lasted between a year and a half and two years. The selected candidates for the course needed to be nurses registered in Australia, and should hold a graduate nursing certificate and five years' experience in the field, with a certificate at the specialist level. They all should be employed during the course formation and provide a letter from their employer with organizational support to enable the candidate to complete all work experience components of the course. The candidates needed to indicate a supervisor, and the supervisor should be a qualified nurse or a doctor with three years of experience in clinical prescriptions. The supervisor had to be approved by the nursing program to guide the 320 hours of professional experience that the student needed to complete during the course. The course time was defined based on consultation with key stakeholders (directors, coordinators, similar programs). Students were also required to have completed a graduate degree in pharmacology before enrolling in the course.

## Discussion

In order to carry out the projects, in all the analyzed works, possible knowledge[10,11,14] gaps were identified. This filter was necessary to define the best tool and the best content that should be elaborated to apply the defined research fields. In Francis'[10] study, meetings were held with nursing directors and senior staff of public and private health services across the university area, highlighting the urgent need for nurses, especially in regional, rural and remote communities, to work with other health professionals to achieve better health outcomes for the population.

The feedback from this consultative process showed the need for the program to focus on health assessment and advancing knowledge of specialties in areas such as primary health care, mental health, indigenous health, chronic diseases and disease management, emergency/high dependency nursing, and palliative care. Therefore, the leading and management theory was identified as a consistent topic to be incorporated in the curriculum. Francis[10] study planned to understand the relevance of developing dynamic teaching proposals for clinical practice, promoting better quality of care to the population, in order to provide better access to health education for nursing professionals. The equity in access to health services is improved through the use of technology, such as the telemedicine, in addition to reducing costs and long-distance travel needs to access healthcare[10].

The author Yadav's[14] selected article used as learning models synchronous technologies for the knowledge application (real-time online training platform with specialists and mediators), while Francis'[10] and Yadav's[11] used technology through asynchronous moments (online technology that the student can access at any time of the day to answer questions)[18].

In addition to asynchronous technology, Yadav[11], in order to rectify obstacles found in its previous intervention, suggested that the commentaries health agents themselves were capacitated and elected to coordinate and mediate the group discussions after the video classes. Thus, the lack of tutors was no longer a problem, promoting autonomy and developing interpersonal communication skills among colleagues, and strengthening the bond between the health team. Important challenges to be addressed were raised, such as poor internet connection, restricted access to mobile devices such as smartphones[11,14], transport time, geographic distance, and inequality in care. The authors worked to improve these aspects[10,11,14].

This research identified a small number of researches involving permanent training mediated by technologies in primary health care. The silence on the subject, mainly in Brazil, was one of the most important limitations for the construction of the systematic review. From the articles found, two are from India[11,14] and one from Australia[10].

During the work construction, some obstacles were found, both in the search strings and chosen bases. The search string needed several adaptations to present coherent results in the research. To reach more works, it was initially considered six data bases, but during the string application, two bases were disqualified due to the inexistence of studies, while the IEEE Explore Digital Library proved to be the most effective database regarding the amount of results, followed by Google Scholar, Capes Periodicals and SCOPUS.

## Conclusion

Having a model, or a method, for the application of permanent education in primary care, would bring as benefits, knowledge for health professionals, and promotion, and prevention of diseases to the enrolled population. Using technological means for this purpose can result in better adherence to PE, as the analyzed works in this study[10,11,14], and if a web technology is used, it can facilitate the professional's acceptance, as he or she has the opportunity to access it from anywhere without having

an obstacle to learning. The use of synchronous and asynchronous technologies is a facilitating mean for the learning process in the continuing education of health professionals[14,11].

The technological resources usage in the primary care professional formation showed itself as a little-experienced practice. Therefore, there was a need to build more projects and articles involving this topic. Hence, it is considered that the creation of a viable model to be applied in primary health care is something innovative and necessary for the advancement of society. It is expected, as future work, to develop studies focused on this theme, due to the identification of this knowledge gap in primary health care.

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