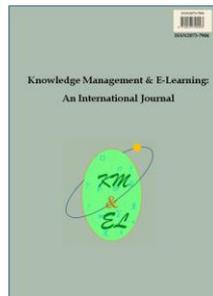


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**Griet Samyn
Manusika Rai
Carole Piriou**

i+solutions, The Netherlands

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e-Learning to create a community of learning and practice for supply chain management in healthcare

Griet Samyn*

i+solutions, The Netherlands
E-mail: gsamyn@iplussolutions.org

Manusika Rai

i+solutions, The Netherlands
E-mail: mrail@iplussolutions.org

Carole Piriou

i+solutions, The Netherlands
E-mail: cpiriou@iplussolutions.org

*Corresponding author

Abstract: The article advances and describes a new way to strengthen the capacity of health workers in the domain of supply chain management of medicines. Although the focus on SCM in health is relatively recent, a well-functioning supply chain system embedded within the overall health system is nowadays recognized as a prerequisite for the continuous availability of quality health commodities. Availability of medicines directly improves the quality of patient care and also enhances trust in the health system, especially by those in need. Efforts to build capacity and improve skills in SCM have moved between in-service training of practising health workers towards introducing the discipline as part of pre-service university programs. The attempt to create a Community of Learning and Practice through the use of e-learning, is an approach meant to transcend the difference and shortcomings of both pre- and in-service trainings and prepare health workers for the new job expectations of today and tomorrow. Some advantages and drawbacks of e-learning are explored in more detail, and solutions suggested. A case study is described where participants who followed an introductory SCM course in a pre-service setting as well as others who enrolled in an in-service session online have all become part of an alumni course where the availability of updated content, topical discussions and exchange of experiences is continuously guaranteed. Although more research and surveys are required, it is expected that belonging to an active online community on SCM in healthcare will not only reinforce capacity and improve the availability of medicines, but lead to broader HR advantages in healthcare.

Keywords: Supply chain management; Capacity building; e-Learning; Community of learning and practice; Pre- and in-service trainings

Biographical notes: Griet Samyn is an anthropologist (PhD) and educationalist specialised in eLearning. She has been involved as a consultant with the set-up and operation of i+academy from the start. Her main responsibilities on the learning platform concern the didactic composition of the courses and the

pedagogical interaction with the participants.

Manusika Rai is a pharmacist currently working as a Senior Consultant in supply chain management with i+solutions. She is involved in developing and facilitating modules on supply chain management both as e-learning courses on i+academy and face-to-face trainings.

Carole Piriou is the Senior Training Coordinator at i+solutions and one of the managers on i+academy, the online learning platform of i+solutions. Her role is to expand and enhance the training services in response to capacity building challenges in resource-constrained health systems.

1. Introduction

The delivery of quality healthcare necessitates patients having access to quality products as well as quality services. Yet one third of the world population does not have access to essential medicines and medical supplies, predominantly in low- and middle-income countries. Access to medicines is dependent upon the availability of essential medicines to treat prevalent public health conditions. Continuous availability demands that there is a well-functioning supply chain system embedded within the overall health systems.

One of the many challenges with supply chain management (SCM) is inadequate human resources. Capacity building efforts have been undertaken since a number of years to enhance the SCM skills of health workers, mainly through focussed in-service trainings. Recently, a need has been identified for professionalisation and the inclusion of SCM courses in the educational programs of various health professions.

In this article, we will suggest a way to transcend this division between pre- and in-service trainings and create a sustainable community of SCM learning and practice through the use of an e-learning platform. We will start with a description of the state of affairs of SCM training in health. The second section will offer a brief analysis of the characteristics of pre-service and in-service trainings and explain the need to transcend the division and pave the way towards a new educational approach. In the third section, the advantages and challenges of e-learning will be exposed, to be followed by the concrete modus operandi by which we have started to create a sustainable community of learning and practice (CoLP) in the fourth. The article ends with an outline of the main challenges encountered and the conclusions.

2. The current state of SCM training in healthcare

Supply chain management in healthcare is the active management of all activities that are needed to bring medicines and medical supplies to the end user. They include product selection, demand forecasting, product quantification, procurement, storage and distribution, and rational use. The goal of SCM is to ensure the availability of quality-assured medicines in the right quantity at the right time and at the right place.

Yet it is only in recent years that supply chain management received due attention in the global health agenda. The surge of HIV/AIDS and tuberculosis, and the continuous prevalence of malaria underscored the impact these life-threatening diseases have on health systems. The early 90s saw an unprecedented increase in investment to improve

access to life-saving medicines sending enormous amounts of products through countries' supply chains. This fostered the need to have efficient systems in place for managing these essential health commodities, ensuring sustainability of access for healthcare service provision and making optimal use of resources. The discussions on supply chain management issues catalysed further and ended up drawing the attention from the global community.

Problems with supply chain management exist at all levels, ranging from inefficient procurement systems to poor inventory management, inadequate resources, deficient infrastructure and inadequate human resources (HR). Lack of appropriately qualified HR results in poor management of medicines and health products, leading to stock-outs and wastage of resources. Human resource challenges in low- and middle income countries range from an inadequate number of staff to a lack of skills in supply chain management. Task shifting is a common phenomenon in these settings where individuals with inadequate or inappropriate qualification are tasked with SCM functions in order to address HR shortages.

Logically, a need to train personnel working in supply chain was identified. Capacity building, in the form of in-service or on-the-job training was adopted by the big donor organisations (USAID Health Care Improvement Project, 2013). Efforts to develop training manuals on drug supply management, spearheaded by the World Health Organization (WHO) in collaboration with Management Sciences for Health (MSH), started as far back as 80s. Today, numerous organisations provide training on SCM.

In recent years, further examination of SCM workforce challenges identified the root cause of the problem as a lack of professionalism and a failure to acknowledge the essential strategic role the health supply chain workforce plays within health systems (People that Deliver, 2012). Supply chain management responsibilities are rarely recognized as part of the job responsibilities of health professionals, what means that those who carry out these tasks have not received any formal training in these areas. In 2011, a number of diverse organisations came together to form the People that Deliver initiative with the common goal to develop sustainable workforce excellence for health supply chains. Achieving this goal called for a change in cultural and institutional perceptions about supply chain personnel. Professionalisation of supply chain management means preparing health workers for tasks that are often part of their job through pre-service education.

3. The difference between pre- and in-service trainings

Is the division between pre- and in-service trainings merely a question of context and occasion, or are there more fundamental differences between them?

It is an interesting exercise to apply concepts from monitoring and evaluation (M&E) programmes commonly used by non-governmental (NGOs) or private organisations to the field of education. One could say that in the traditional setting of a school or university (the formal pre-service training), emphasis has always been laid on immediate outputs. The pupil is taught a broad range of subjects and is tested for the knowledge gained directly after the training through assignments and exams. The translation of classroom knowledge into practice can be challenging, especially if the curriculum is dissociated from real-life circumstances in the workplace. Little evaluation, if any, is done to assess this aftermath. Educators seem to silently imply that outcomes and impacts will follow automatically from the years of schooling.

At in-service trainings, the importance of an immediate positive outcome and a possible broader impact is embedded in its objectives. Professionals are trained on the job (or in a temporary training setting close to the job) in a skill they need for its better execution. Participants often benefit from their own practical experience in the workplace, which they bring to the trainings. Sometimes a test or assignment is given at the end of the training week, measuring the output. However, more emphasis is put on the long-term effects of the training. In a best case scenario, a survey is done after a certain time to evaluate the outcome of the training: are the workers trained filling in the stock-keeping forms more consistently, are orders delivered more on time, etc.

Both approaches have their own kind of pitfalls. In pre-service trainings, the student is taught a broad range of subjects that, though interesting and hopefully mind broadening, could be of little use in his/her later professional life. While in-service trainings are shorter and do not take participants away from their workplace for long periods of time, the scope of the content taught is narrow and aimed at the job at hand.

Moreover, they often cannot cover all health professionals due to a lack of adequate resources and a high staff turnover. In today's world, where job expectations of skills and knowledge are continuously broadening and evolving and where professionals too change jobs and positions frequently, a new approach that transcends this division is indicated. This is true for many professional domains, but even more so for the health sector where the need and best way for continuous professional development has been a point of discussion since its inception (DiMauro, 2000).

4. e-Learning as a way to transcend the difference

e-Learning, or systematic education through the use of computers (or smaller devices) and the internet is, by definition, a recent phenomenon. The software most broadly used in the field was made available in 1997 (Blackboard, private company) and 2002 (Moodle, open source). There are many advantages commonly associated with e-learning: accessibility (time, place), flexibility (learning styles), scalability, cost control, upgradability of content, sociability, equality and equity and the possibility to monitor and evaluate without large additional investment.

4.1. Strengths of e-learning

We will not dwell on each of these characteristics, and limit ourselves to the ones that offer an immediate support to our project to transcend the division between pre- and in-service and create a durable SCM community of learning and practice.

Upgradability of content

In a traditional setting, a textbook or participant's guide with the required learning content was printed and distributed among the students. This was a useful tool during the training and became often a cherished possession of the successful student. In many cases, however, commensurate with the duration of the professional life, its content became more and more out-dated. An online course, on the other hand, offers participants the opportunity to access new updated content (a feature that can be actively highlighted when the last date and time of the update is shown to all participants). New evolutions in the field of SCM (e.g. the introduction of 'for profit' schemes by donors or new distribution models) can be highlighted, new publications can be added to the reading list, and obsolete data can be removed.

Sociability

It did not take long for educators to see that the success of the social media held a promise for learning as well. The experiences and potential of learners and the interactions between them could be used as an active learning tool (Creasman, 2014; Zhou, 2015). Social activities such as discussion forums, workshops and chats were integrated in the learning platform. Students are allowed to share their own examples, upload articles they find interesting and suggest new topics and courses. This too means breaking away from a position of teacher authority towards a more level community where co-teaching is possible and learners can at any moment become teachers as well (Lewis & Sincan, 2009).

Monitoring and evaluation

Taking away some routine activities from the work load of the teacher (most obviously, the repetitive grading of questions with a clear-cut answer) is one of the advantages of e-learning. This gives a good teacher more time to follow the progress of each of the students. No other media is keeping this perfect track of everything done and not done as the internet. The time the user logs in, on which links he clicks, what answers she picks during the first attempts and how her grades in a quiz improve, everything is stored in the logs. They offer all information needed to answer questions of outputs. Perhaps more importantly, this information can be made available to the participants and used for self-evaluation, returning the responsibility for the own learning progress to the learner.

The broad reach of the internet and the easiness to connect also broadens the scope for longer term evaluations. At regular intervals, a short survey can be sent to alumni, enquiring if they are still actively engaged in the field, if they apply the acquired knowledge, if they have new learning needs. A lot can be learnt from the discussion forums too. In this way, a more or less systematic evaluation can be done of the outcomes and the impact of the training (Khan, 2005).

4.2. Drawbacks of e-learning

The most obvious challenge of e-learning is the infrastructure it requires: electricity, internet bandwidth and an electronic device. The low and middle income countries where the need for SCM training in health is most acute, are the ones often least equipped to offer a stable e-learning environment, even more so in rural and isolated areas. On the one hand, though, the difficulties and cost of offering face-to-face trainings in these regions are often higher still. There is also, on the other hand, an unmistakable progress in LMIC countries towards better infrastructure and smaller and cheaper smart devices. e-Learning is one field that can take advantage of this evolution.

The other important question is: does e-learning works? What does the comparison between e-learning and classical training show? Are students learning as much and as good on the computer as in the class room? Is there no higher probability of the 'illusion of understanding'? (Schwartz, 2014) Evaluating the quality of learning is per se a difficult task. One only has to think of the unresolved debate if students of today are performing worse or better than earlier generations before them. The impact of learning is broad and depending on the criteria examined (memorizing, critical thinking, creative problem solving, spelling, application of skills ...), one can get a totally different result (Means, Toyama, Murphy, Bakia, & Jones, 2009). Beginning 2015, the WHO in collaboration with Imperial College London conducted a systematic review of the scientific literature to evaluate the effectiveness of e-learning for undergraduate health professional education. One of the conclusions of the ensuing report is that "the

findings of the included studies suggest that both computer-based and web-based eLearning is no better and no worse than traditional learning with regards to knowledge and skill acquisition" (Al-Shorbaji, Atun, Car, Majeed, & Wheeler, 2015, p. xvi). Other studies are equally inconclusive.

The two subsequent paragraphs of the WHO/ICL report offer a good illustration of another challenge in e-learning. The first reads: "Learners usually reported the following advantages in relation to eLearning interventions: ease of access and flexibility, portability, improved student-teacher contact and discussions, and increased discussions with peers." The second lists the most common disadvantages reported by learners: "more time-consuming, lack of student-teacher interaction and tutor support, feelings of isolation, being unable to clarify doubts with a tutor, and lack of in-depth group discussion" (Al-Shorbaji et al., 2015, p. xvi-xvii). It is interesting to note that the same feature, "student-teacher interaction", is both mentioned as a strength and a weakness. The role of the teacher or online facilitator is as pivot in e-learning as it has always been in education. Many MOOCs (massive online open courses) or other online courses who try to do away with the role of the teacher, have not had the success they expected.

e-Learning courses are mainly designed to develop cognitive skills thus it is ideal for building knowledge and comprehension about SCM in general. This is particularly useful for advancing advocacy and promoting leadership in SCM. However, SCM is a broad topic and encompasses numerous functions, some of which require more practical and hands-on training to build the necessary skills. Thus for modules like inventory management, learning is more effective if theoretical aspects taught through e-learning are supplemented with practical exercises.

5. Creating a community of learning and practice through sessions and alumni courses

In our quest to create a SCM community of learning and practice through our e-learning platform i+academy, we have developed the following training procedure. When an independent professional (in-service) wants to receive an introduction to the supply chain cycle of medicines or a more in-depth instruction on one of the steps of the cycle, he or she becomes enrolled in the next active training session online. Participants who partake of a program follow the discipline in a blended learning set-up, where the online course is accompanied by a face-to-face training week. The online sessions have a set duration (of 4-6 weeks) and are actively facilitated by at least two facilitators. These trainers write messages to the participants, follow their progress, stimulate their engagement in discussion forums, comment on submissions to assignments and respond to any relevant request made by a student. In sum, these sessions emulate as closely as possible a classical classroom setting or a group session. Based on their participation, successful participants receive a certificate and an e-badge at the end of the training.

Their involvement does not stop here, however. After a wrap-up period of two weeks (giving them the time to take leave), the session closes and all participants are enrolled in the alumni course of their chosen topic. There they join the community of all former and future participants. This 'master course' contains all lessons and quizzes for self-evaluation and a global discussion forum where they can continue discussions started earlier on, or post new ones. The content of the alumni course is updated after each active session to guarantee that it stays up-to-date. The only activities absent are the ones who require active assistance by a facilitator. The facilitators stay available though. They can be contacted with questions or suggestions, or new course requests. If someone prefers to,

he can unenrol himself from the course. But as long this does not happen, access to the course is guaranteed.

As a concrete example, we'll briefly describe the trajectory of the course 'Basic Principles of Supply Chain Management in Healthcare'. The course content was developed by i+solutions trainers as part of a new Master program in International Health Management (MBA) offered since 2013 by the Swiss Tropical and Public Health Institute in association with the University of Basel. The inclusion of an SCM discipline in a MBA program formed part of the recent professionalisation and pre-service tendency described earlier on. Since then, the course have been adapted twice to meet the needs of specific participant groups. With the support of the Reproductive Health Supplies Coalition's Innovation Fund, the course was translated in Portuguese and set-up to be part of the pre-service programs (Bachelors and Masters), Pharmacy, Hospital Administration, Public Health, and Clinical and Laboratory Analysis at the Faculty of Health of the Universidade Católica de Moçambique. Focus was placed on the supply chain of reproductive health commodities. Another adaptation was made in the context of the Universal Access to Female Condom joint program, to assist the face-to-face in-service training of health workers in Cameroon and Nigeria.

In addition, the course was made available online through six-week sessions with facilitators both in English and French. In the map below (Fig. 1), you can see the different countries where the people who have enrolled come from. Most of them are professionals who have an immediate interest to learn more about the supply chain management of medicines (in-service). The participants come from various backgrounds such as medicine, pharmacy, research and medicine regulatory affairs working in public health worker, non-governmental organisations, and international agencies.

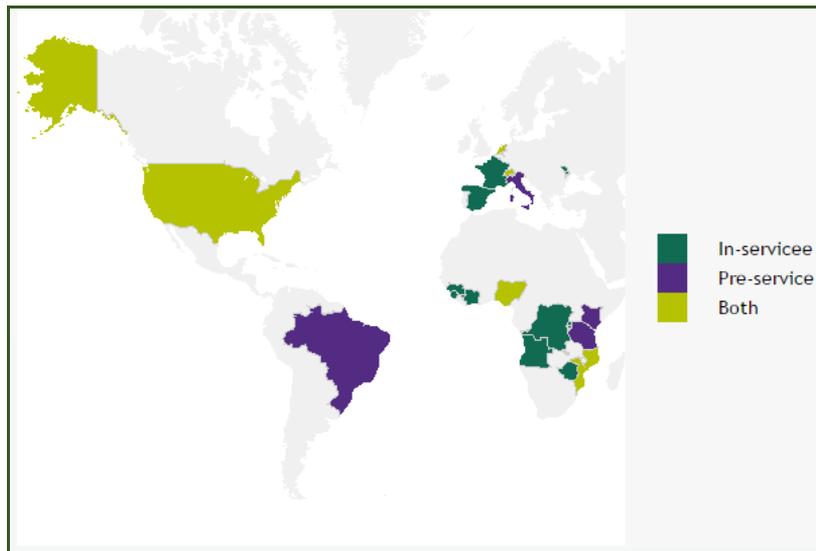


Fig. 1. Geographical distribution of in-service and pre-service training participants of the course "Basic Principles of Supply Chain Management" on i+academy

Currently, the alumni course on 'Basic Principles of Supply Chain Management in Healthcare' counts with 87 participants, the French version has 25 participants. The more thematic courses on quality assurance of medicines, and good manufacturing practices and GMP inspections add 16 and 16 respectively. Of the 144 alumni, 72 are male, 53

female, 19 did not specify their gender. Their age group, displayed in Table 1 below, indicates that the courses are popular among mid-level professionals.

Table 1
Age of alumni students on i+academy

Age	Number
21-30	12
31-40	39
41-50	51
51-60	14
61-70	1
Not specified	27
TOTAL	144

6. Challenges of the project

During the first year of implementation of this training procedure, we have encountered some challenges. The first is related to a question of motivation and appeal. The second and third have to do with the sustainability of the project. Lastly, capacity building in supply chain management will only be fully effective if it is part of a more encompassing approach towards health system strengthening.

Although the students activity and completion records are good to excellent for the facilitated course sessions, we have noticed a sharp drop in their engagement once they are enrolled in the alumni course. As was in a traditional learning setting, the learning process seems to come to an end with the issuing of a certificate. Even when participants request for continued access to the materials during sessions and seem happy with the solution (not one of them has actually unenrolled), they seldom visit their alumni course. This could partly be due to their attitude to study and work, and their having a busy professional life. The idea that in today's world it is no longer possible to attribute different life stages to learning and working (in a before and after), and that continuous learning and professional development supposes self-motivation and flexibility needs probably time to translate in an effective behaviour shift. On the other hand, it is our responsibility to set-up the alumni course in such a way that it's content and activities is of long-term appeal and interest.

Another important question concerns the regulation of the course. Will the course be autonomous and will the participant group guide itself? Or is there need for the role of facilitator on the background, who takes some responsibility for the quality and content of the discussion forums, and more in general, its overall organisation. If yes, does this necessary has to be content creator or session facilitator? Or could a participant in turn volunteer to temporarily take on this task?

The answer to these questions is of importance for the next issue: financial sustainability. Although the cost of maintenance of a virtual classroom is small compared with a physical environment, there still is need of a server and an IT administrator who takes care of its functionality and protection. Should this be covered by other projects? Or should voluntary contributions, or even a small membership fee be considered in the future?

Finally, supply chain system strengthening interventions need to acknowledge the complex relationships between the different building blocks of a health system (leadership and governance, health financing, health workforce, medicines and technologies, information and research, and service delivery). Vertical or unilateral approaches focusing on a single building block can only have limited or short-term effect. Strengthening human resources, as described in the scope of this project, will not be sufficient to generate longer-term and sustainable impact on overall supply chain management in the countries.

7. Conclusions

In this article we have proposed a new way to strengthen the capacity of health workers in the domain of supply chain management of medicines. SCM is a relatively new field of interest in the health sector but one that deserves high attention. Quality patient care demands that products and services are available to those in need. Medicine shortages and stock-outs create gaps in service provision and thus affect patient care. Availability of quality-assured essential and life-saving medicines is ensured through a well-functioning supply chain system of which qualified human resources form a part. Advances in SCM capacity building as part of overall healthcare provider training, is anticipated to address the current gaps and strengthen management of essential medicines that will ultimately guarantee the safety and quality of patient care. Earlier efforts to build skills in this area have moved between the in-service training of practising health workers towards introducing the discipline as part of pre-service university programs.

Through the use of e-learning, we have devised a way to transcend the division between pre-service and in-service trainings and create a SCM community of learning and practice. Participants who follow the course in a pre-service setting or enrol in a session online become part of an alumni course where the availability of updated content, topical discussions and exchange of experiences is continuously guaranteed.

While exposing the strengths of this broad e-learning approach, we have not turned a blind eye to the drawbacks of the method, further investigation and surveys are needed to find best practices and surpass the possible challenges in the field. Training health workers in supply chain management by creating an active community of learning and practice would, however, not only improve the delivery of quality healthcare by guaranteeing access to quality products. Its positive impact would probably be broader. Being part of an online community will undoubtedly reduce the feeling of isolation of health workers in remote rural areas and perhaps even enhance the retention of qualified health staff.

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