

ELEARNING FOR HEALTH IN BRAZIL: UNA-SUS IN NUMBERS

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Abstract

Use of technology enabled learning for distance education in the health field is growing, and new challenges are emerging related to reaching health professionals working in remote areas. The Open University of the Unified Health System (UNA-SUS) promotes Continuing Professional Development and uses Technology Enhanced Learning (TEL) for distance education to the Brazilian health workforce, mainly in primary care. **Methods:** As part of ongoing quality assurance assessments, we performed a descriptive analysis of courses, learners, and completion rates from all enrolments in UNA-SUS for Qualification and Specialisation Courses. Data were collected directly from the UNA-SUS information system. **Results:** From March 2008 to October 2015 (91 months), UNA-SUS had 206,834 enrolments in 40 Specialisation Courses and 60 Qualification Courses, reaching 119,109 professionals (mean - 1.7 courses per person). These were distributed amongst 5,199 Brazilian municipalities, 59% of which had a population of 10,000 to 50,000 inhabitants. Learners were mainly women (80.6%), nurses (26.4%), and working in primary care (39.8%). Completion rates were 67.3% for Specialisation Courses and 37.9% for Qualification Courses, which were self-instructional. Reaching 93% of all Brazilian cities and 119,109 learners, UNA-SUS was able to deliver health education to health professionals (physicians, nurses, and others) in rural and other areas of shortage such as indigenous districts and metropolitan outskirts. UNA-SUS has succeeded in expanding ten-fold the seats for Specialisation Courses for family health, and has good results in TEL Qualification Courses. UNA-SUS has innovated Continuing Professional Development for health professionals in Brazil. These courses responded to the previously unattended educational needs of the workforce, focusing on reaching primary care professionals in

smaller towns and remote areas. UNA-SUS is consolidating itself as a nationwide provider of continuing education.

Keywords: elearning; distance learning; health policy; continuing professional development; Brazil.

Introduction

The Open University of the Unified Health System (UNA-SUS) in Brazil was initially conceived as a decentralised Network of Federal Teaching Institutions (Federal Universities) cooperating in the field of health education. The Ministry of Health (MoH) led the initiative and UNA-SUS was launched on June 18, 2008 by the Health Minister. The goal was to raise the number of Family Health Specialisation Courses ten-fold, from fifteen hundred seats per year to fifteen thousand. In Brazil Specialisation courses can only be offered by academic institutions and have a minimum of 360 hours of contact time. The starting point of UNA-SUS was negotiation between candidate Universities and the MoH, with associated alignment of pedagogical and operational standards that were set concurrently by mutual agreement.^{1,2} This way, UNA-SUS started offering Specialisation courses by the a network of Universities, and with time, the spectrum of the courses broadened.

MoH data about primary care teams in Brazil shows 39,905 Family Health Teams (FHT) in the country. FHTs are the primary care resource in Brazil, and are composed of a Physician, a Nurse, two nursing technicians, and four to eight Community Health Agents (CHA). A mission of UNA-SUS is to raise the capacity of these professionals to achieve better quality of care within a health worker centred setting that builds towards a universal and equitable health system.^{2,3}

With the success of the project in raising the number of places for courses, Brazil's Presidential office decreed UNA-SUS as a permanent health

educational system in 2010. According to the decree, UNA-SUS consists of a relationship between three groups; first, a Network of Universities, Public Health Schools and the Oswaldo Cruz Foundation (Fiocruz). This Network produces and offers Technology Enhanced Learning (TEL) courses for health professional development. Second, the Collection of Educational Resources in Health (ARES), is published in a repository with the following features: federated, open access, copyleft, quality assured, and standards-based. Third, the Arouca Platform (PA), a national database of health professionals, gathering together their professional experience and educational history.^{4,5}

Since 2011 UNA-SUS has been producing self-instructional courses directed to specific educational needs of the health force, mainly in primary care. These needs have been identified by sectors of the MoH, based on issues that are prevalent and strategic in the Brazilian health field. In this paper we refer to these courses as qualification courses, as it is the title of the certificate that can be issued according to Brazilian educational regulations.

In 2012 UNA-SUS expanded their range of activities to support complex nationwide educational programmes. It started with the Home Care qualification programme, designed to develop a new health policy of patient management through home healthcare services. This programme comprises twenty-three Qualification Courses and two Specialisation Courses.

In the same year UNA-SUS became responsible for the educational activities of the Federal Government's health professional provision policies. These were put in place to stimulate primary care in rural, remote, and other underserved areas. These programmes involved the Primary Care Professionals Valuation Programme (Programa de Valorização dos Profissionais da Atenção Básica – Provab) and the Programme More Doctors for Brazil (Programa Mais Médicos para o Brasil - PMMB), launched in 2013. In Provab and PMMB the health professionals serve one to three years in primary care and during this period they must attend specified educational activities, composed of a Specialisation Course in family health, online qualification courses, and a monthly supervision visit to their workplace by a more experienced medical doctor assigned by a neighbouring University or Hospital.

Methods

To evaluate the achievement of UNA-SUS goals, we performed a descriptive analysis of courses, learners, and completion rates from all enrolments in UNA-SUS for Qualification and Specialisation Courses to understand the characteristics of users, uptake of the Courses, forms of association of the learners with our courses and the success of the programme. Data presented in this paper were extracted from Arouca Platform (PA). As UNA-SUS is a national decentralised educational system, there is no simple direct access to University databases. Course monitoring is made through information extracted from each Virtual Learning Environment (VLE) around the country. Data are fed from the VLE to PA using the methods and parameters defined for UNA-SUS.

To ensure that identity information from the different VLEs can be linked, UNA-SUS requires core attributes: name, email, and National Taxpayer Registry Number (CPF). Reports about courses sent by Universities to UNA-SUS must include the core attributes for every learner. Also, these data are used in the UNA-SUS single-sign on system, based in the Security Assertion Markup Language (SAML). To protect privacy, the communication between web browsers and the application server is protected by Secure Sockets Layer (SSL). Further, the Simple Object Access Protocol (SOAP) requires client authentication with digital certification. Web services are available for complete communications of VLEs with the PA, including: checking if candidates meet requirements, registering for courses, informing enrolment lists, and uploading course certificates. UNA-SUS developed modules for Moodle™ web-services integration with PA, so for most courses data are updated just-in-time. Moodle™ is an open-source VLE that is used by the educational institutions of UNA-SUS Network and became a *de facto* standard.

Using the same core parameters, data are linked automatically between the PA Database and other government databases, allowing UNA-SUS to gather professional experience information. These data are used for enrolment requirements and learner profiles. The main data sources are: the National Health Facilities Registry (CNES), National Commission of Medical Residency (CNRM), and the Federal Medical Council (CFM). From these sources information such

as age, sex, profession, and location of the health facility where the learner works can be gathered.

PA provides the following data about the courses: issuing University, course name, level, and start and end dates for class. Course levels were grouped into Qualification Courses for the one's with less than a 360 hour load, and post-graduate Specialisation Courses for the ones with more than 360 hour load. Qualification courses are self-instructional, as that was no budget for educational supervision for these courses. Each learner is informed of the dates of their enrolment and completion.

The Mondrian Application Programming Interface (API) is used for DataWarehouse development, where UNA-SUS developed a cube with learner's data, from which we extracted the data presented in this paper.

Results

From March 2008 to October, 2015, there have been 206,834 course enrolments by 119,109 unique learners, distributed amongst 5,199 (93%) of the 5,570 Brazilian municipalities. Typical learners are graduate professionals (92%) working in the health sector, mostly female (80.6%), and with an average age of 37 years. Of the total enrolments 43,631 (21.1%) were in 40 Specialisation Courses and 163,203 in 60 Qualification Courses offered by UNA-SUS.

With 119,109 learners enrolled in 206,834 courses, with a mean of 1.7 courses courses per learner. Most learners (82,498; 69.3%) enrolled in only one UNA-SUS course, while most of the remainder (19,326; 16.2%) enrolled in two courses. Three learners enrolled in more than 35 different UNA-SUS courses. The number of courses per learner is presented in Table 1.

Most of the enrolled health professionals whose clinical service could be identified were working in Primary Care (39.8%), while professionals working in Hospitals or Secondary Care services accounted for almost another 20% of enrolments. (Table 2)

Nurses accounted for about one quarter of the enrolments, followed by physicians (15.1%). The distribution for all healthcare workers is shown in Table 3.

The distribution of health professions correlates to the feminisation of the sample with the percentage of women per profession as follows: 87% of the Nurses, 54% of the Physicians, 84% of Nursing Technicians, 70% of Dentists.

Table 1. Number of courses per learner, UNA-SUS 2008-2015.

Number of courses	Number of people enrolled
One	82,498
Two	19,326
Three	7,326
Four	3,711
Five	1,992
Six and more	4,256
TOTAL	119,109

Table 2. Clinical services of enrolled learners in UNA-SUS courses, 2008-2015.

Service	Number Enrolled	%
Primary Care Services	82,413	39.8%
Hospital Services	22,962	11.1%
Secondary Care Services	15,170	7.3%
Health Management	9,726	4.7%
Emergency Services	5,107	2.5%
Other Services	2,800	1.4%
Unidentified	68,656	33.2%
TOTAL	206,834	100%

Table 3. Profession of learners enrolled in UNA-SUS courses, 2008-2015.

	Number Enrolled	%
Nurses	54,563	26.4%
Physicians	31,305	15.1%
Health Technicians	15,527	7.5%
Dentists	9,210	4.5%
Community Health Agents	2,368	1.1%
Other Professionals	8,978	4.3%
Other Health Professionals	16,227	7.9%
Unidentified	68,656	33.2%
TOTAL	206,834	100%

Most enrolments (59%) were from health professionals working in municipalities with a population of 10,000 to 50,000 inhabitants. The number of Municipalities with learners involved in Specialisation and Qualification Courses of UNA-SUS is shown in Table 4.

Table 4. Proportion of municipalities with enrolled learners, UNA-SUS, 2008-2015.

Type of course	Number of Municipalities with Enrolments	Total Enrolments
Specialisation	4,300	43,631
Qualification	4,841	163,203
TOTAL	5,199	206,834

To understand the territorial distribution of learners in Specialisation and Qualification courses, regional maps were produced (Figures 1 and 2). These maps show the 496 Health Regions of Brazil. Brazilian legislation describes Health Regions as groups of municipalities under the same Regional Health Planning Commission.⁶ The relationship of Municipalities by Health Region is in accordance with the website of the Department of Informatics of Ministry of Health.⁷ The map is produced using Tableau Public™ software and is published in UNA-SUS website, under UNA-SUS copyright license.⁸

The distribution of learners enrolled in Specialisation Courses is presented in Figure 1 and, learners enrolled in Qualification Courses is presented in Figure 2. The darker (blue) colours indicate more learners in that region. Figure 2 is darker overall as there are more learners taking Qualification Courses. The maps visually suggest that the Specialisation Courses have a flatter distribution.

The notional learning hours for self instructional Qualification Courses ranged from 6 to 180 hours. Specialisation Courses are required to have at least 360 contact hours according to Brazilian legislation. Specialisation Courses also differ from Qualification Courses because they have tutors and present evaluations at the end of some modules and/or units.

To analyse completion rates for alumni, only data for courses that were scheduled to end on 30th September 2015 were considered. In this scenario, there were a total of 135,585 enrolments with 61,384 certificates issued, indicating an average completion rate of 45.3%. When Specialisation and Qualification courses were analysed separately, more learners were found to complete Specialisation Courses (Table 5).

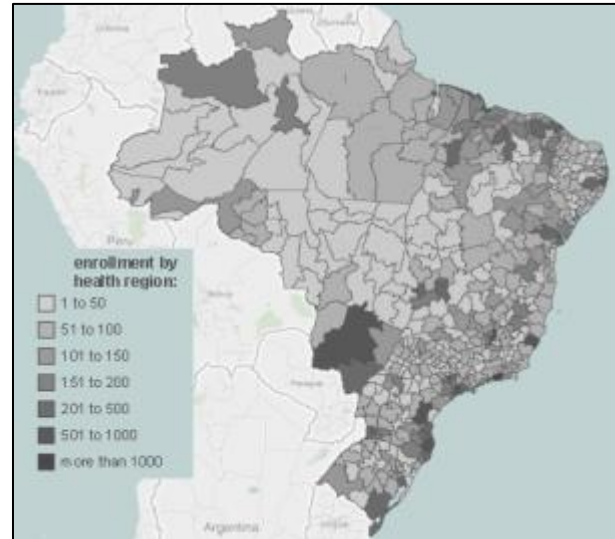


Figure 1. UNA-SUS Specialisation Course Learners per Health Region, Brazil, 1 September 2015.

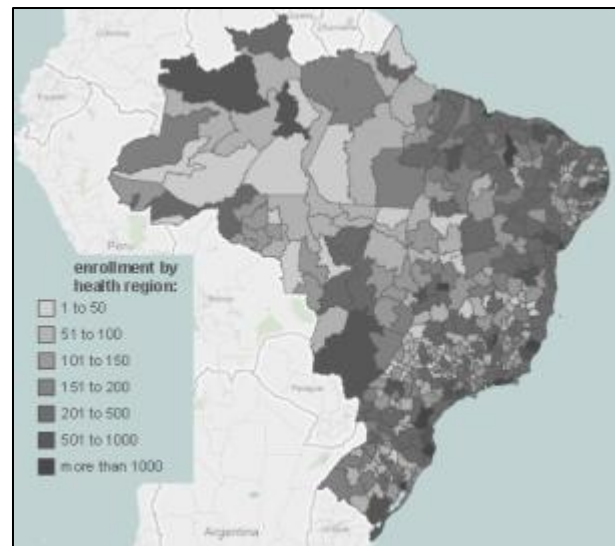


Figure 2. UNA-SUS Qualification Course Learners per Health Region, Brazil, 1 September 2015.

Table 5. Completion rates per course format, UNA-SUS, 2008-2015.

Course	Enrolled	Completed	%
Specialisation	34,055	22,929	67.3%
Qualification	101,530	38,455	37.9%
TOTAL	135,585	61,384	45.3%

Discussion

UNA-SUS set up a new way to deliver Continuing Professional Development education to health professionals in Brazil. It provides free, open access, online courses that can be accessed through computers, smartphones, or tablets. The programme now reaches more than 5,000 municipalities in a single country of 8,515,767 km², equivalent to scaling of a programme across a continent.

Of note is the high number of “unidentified” health professionals. As most online qualification courses are open for enrolment by any Brazilian, the courses are attracting interest from people who are not registered health workers. They may be high school pupils, undergraduate students, people working in health but not in health facilities or someone simply curious about a topic.

Compared to other open online course programmes, UNA-SUS learners have better completion rates. For example, the MITX and HarvardX experience showed a 2 year enrolment of 841,687 registrations from 597,692 unique users (1.4 courses per person), with just 43,196 learners earning certificates (5.1%) and 35,937 learners exploring half or more of course contents without certification.⁹

There are indicators other than completion with which to evaluate course use and success. These include the number of first week only visitors, percentage of course viewed and exercises solved by each learner, and the number of learners who reported the course was useful in their jobs.⁹ UNA-SUS is working for the unification of data across all educational platforms that are allocated in the network universities, in order to analyse the interaction between learners and teaching materials across the entire ‘universe’ of courses. In 2015 satisfaction surveys were run by email at the end of new courses.

There are limitations in comparing UNA-SUS courses to MIT and Harvard courses. First of all, UNA-SUS promotes courses to health professionals, which can be a bias since health professionals may behave differently from MIT or Harvard students in enrolling and concluding courses. Second, some of the courses promoted by UNA-SUS have different ways to evaluate and follow the learner’s evolution in the courses. Third, UNA-SUS courses are designed differently to the ones from Harvard and MIT. UNA-SUS courses are interactive multimedia resources for

self-instruction, and HarvardX and MITX courses are based mainly in video lessons and forum debate.^{2,9}

Additionally, since courses are offered by Federal Universities, the rules of the university itself may force academic secretaries to stimulate the learners to complete the courses, as in some situations TEL courses are registered as extension programmes that need some completion rates to be maintained. Even though, completion rates were greater than expected for TEL. Furthermore, investing in traditional learning (based on physical presence, and tutored education) is impracticable, costly, and inefficient in terms of reaching the large number of distributed health workers in a country the size of Brazil.

Comparison of TEL – especially self-instructional courses – with in-class education in terms of completion rates is inappropriate. Self-learning courses can be useful even when not completed, because in some situations the learners may just have a doubt related to their field and the problem is solved with some information present in the course, without the need to complete it.^{9,11} In other words, it is a quest for knowledge that stimulates professionals to participate in self-instructional courses, more than any certification itself. But, certification matters in Brazil for a few reason. Public tenders for health jobs regularly explicitly require Specialisation courses. Qualification courses are often required for career progression, as proof of continuing professional development. These factors are being considered in terms of future changes in the form of the self-education courses offered in UNA-SUS.

An important finding is that 56% of the learners are in towns with less than 150,000 inhabitants. This suggests that these health professionals found in UNA-SUS learning opportunities they would not be able to if requiring face-to-face education.

Our findings are congruent with what is known about how physicians upgrade their skills and seek knowledge about technical advances. Slotnick has shown that they do so using self-directed learning episodes as their main strategy.¹⁰ We found no studies about self-directed learning episodes for other health professions, It seems that the conventional strategies of attending conferences and travelling to attend short courses is no longer the primary way to achieve Continuing Professional Development education. Whether TEL will replace traditional classroom education is still debated.¹¹ However, this study shows

the strategy of UNA-SUS has succeeded in providing greater access to health education for health professionals living in smaller towns and cities.

The distribution of nurses and physicians was expected as the FHT - the primary care teams in Brazil - are composed of a Physician, a Nurse, two nursing technicians and four to eight Community Health Agents (CHA). Since the major part of UNA-SUS courses are designed for graduate professionals, CHA made up only 1.1% of the enrolments.

Women represent 80.6% of UNA-SUS students. It is important to note that in Brazil most health professionals are women, for example 84.6% of nurses and nursing technicians are women.¹² Further, 40.8% of physicians in Brazil are women,¹³ but of all UNA-SUS enrolments, 54% of the physicians are women.

Why is UNA-SUS's proportion of women learners so high? It may be determined simply by the fact that women are the majority of health professionals, but it may also suggest a gender difference in motivation and the way women health professionals seek educational opportunities? The answer remains unclear and is worthy of future study.

The number of municipalities that enrolled learners and the certification rate of those learners are two indicators of success of UNA-SUS. These indicators scale the attractiveness and the potential spread of our courses.

Conclusion

The findings of this study show that UNA-SUS courses have responded to the identified education needs of the Brazilian health workforce. Primary care professionals throughout Brazil, but particularly in rural and remote underserved locations, who previously had no means of convenient health education available to them are now being effectively and efficiently reached.

Further studies are on course to address each learner's study style, and also their opinion and satisfaction with the course. It is important to not only provide access to learning opportunities, but to assess the extent to which these courses contribute to improving the quality of health services delivered to population. One proxy is the satisfaction of the learners with the course, is whether or not it has been useful in their jobs.

A characteristic of UNA-SUS that will support future studies is the fact that the information system,

based on Plataforma Arouca, treats the health professionals as lifelong learners. Health professionals are being tracked about their professional and educational practice since 2008. This will allow cohort studies about the relationship of health professional educational practices and health facilities performance. Then there will be more clues about how to deliver more effective health professional education, anywhere.

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Conflict of Interest. The authors declare no conflicts of interest.

Acknowledgements: We would like to thank Daniel Guimarães Araújo and Marcos Guadalupe for helping us extracting the data and producing tables and maps.

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