PATH

E-LEARNING IN ELECTRONIC IMMUNIZATION REGISTRY IMPLEMENTATION

A CASE STUDY FROM VIETNAM

PATH IDEAL-Vietnam

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ABBREVIATIONS

EIR	Electronic Immunization Registry
EPI	Expanded Program on Immunization
IT	Information Technology
NEPI	National Expanded Program on Immunization
NIIS	National Immunization Information System

This case study was developed by the IDEAL-Vietnam project, a collaboration of PATH, the Vietnam Ministry of Health, the Vietnam National Expanded Program on Immunization, and Viettel, and authored by team members from PATH and the National Expanded Program on Immunization.

We hope this report will contribute to ongoing discussions about immunization logistics, and we welcome comments from interested parties.

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BACKGROUND

NIIS CONTEXT

Vietnam's electronic immunization registry (EIR), the National Immunization Information System (NIIS), was launched in 2017 by the Vietnam Ministry of Health. A digital system, the main goal of the NIIS is to provide an accurate and timely record of all clients' immunization histories, from cradle to casket. The NIIS can be accessed on any electronic device, anywhere with internet connection. In a country like Vietnam, which had a reported internet penetration rate of 77.4 percent in 2022, this means that the NIIS will be widely available to end users across the nation.[1] However, regardless of accessibility, the system developers know that without appropriate trainings for end users, the EIR would not be successfully implemented.

IDEAL PROJECT

In 2018, with support from the Bill & Melinda Gates Foundation, PATH launched the Introducing Digital Immunization information systems: Exchange and Learning from Vietnam (IDEAL) project in an attempt to show what systems and supports need to be in place in order to shift the country to a fully digital national platform. Hanoi, an urban setting, and Son La, a rural mountainous setting, were selected as project sites. Working in collaboration with the National Expanded Program on Immunization (NEPI), the first phases of this project included the development of training materials for, and the ultimate realization of, training-of-trainer sessions and cascade training series for health care workers on the use of the NIIS to educate health care workers to become NIIS experts in their own communities.

However, trainings bring with them a hefty cost, which includes not only the financial expense of travel and meetings for facilitators and participants, but also the cost of personnel time spent on the trainings.[2] In addition, refresher trainings and training of new health care workers would all need to be considered for future implmentation.[3] So, to supplement in-person trainings and help foster a culture of continuous learning, the IDEAL project launched an e-learning platform for NIIS modules.

BENEFITS OF E-LEARNING

As the world has become more connected through information technology (IT) and the internet, many systems, including teaching and learning, have moved online in an effort to adapt to the most current standards in connectivity. Electronic learning (or e-learning) makes education more accessible regardless of time or location, and it allows learners to go at their own pace and following their own schedules, wherever they may be.[4,5,6] It can also improve the quality of education and create innovative forms of education that can reach a larger audience.[2] The flexibility of e-learning is of particular use to health care workers who, due to busy schedules, can benefit greatly from trainings that they can tailor to suit their own availability and needs.

One study in China highlighted the need for e-learning in health care settings, particularly in low- and middle-income countries, where high-quality continuing education for health care professionals at the grassroots level may be lacking.[7] The researchers found that e-learning had the greatest impact on clinical and primary care health workers, enhancing their general skills.[6]

The NIIS is updated frequently with new features to support end users. For health care staff in Vietnam using the NIIS, e-learning provides an opportunity to stay up to date on the system changes, and it serves as a readily available resource on different aspects of the NIIS itself. Enhancing the skill set of health care workers will increase their ability to use the NIIS effectively, ultimately improving the quality of data in the system. Improved data quality encourages data use, leading to more effective monitoring and planning at all levels of the system.

As mentioned earlier, e-learning saves both time and costs when compared with in-person trainings.[2] Because of a lack of resources, remote areas, like Son La Province, which is a project site for IDEAL, might not have access to as many in-person trainings as their urban counterparts. Using e-learning means health care workers in all settings can be kept up to date on system changes regardless of resource allocation.

Key benefits of e-learning for health care workers

- Learning location extended to everywhere with internet connectivity and not limited by place or time, which means health care workers can set their own schedules.
- More equitable because it extends the reach of continued education to more people through an easily accessible platform, including to health care workers in rural, remote, and hard-to-reach locations.
- Self-paced and supports individual learning styles and needs.
- Cost-effective because it can be rolled out on a national scale at a lower cost than in-person trainings.
- Time efficient in the longer term; quicker to implement and roll out than in-person trainings.
- Easily adaptable and consistent. For a system that is constantly changing like the NIIS, e-learning can be quickly modified to reflect those changes.
- Builds a resilient education system wherein the subject matter is sustainable.
- Offers a possible solution to trainer shortages. Although some learning, like clinical skills, must continue to be done in person, e-learning streamlines content without depending on trainers and facilitators.

E-LEARNING AND THE NIIS

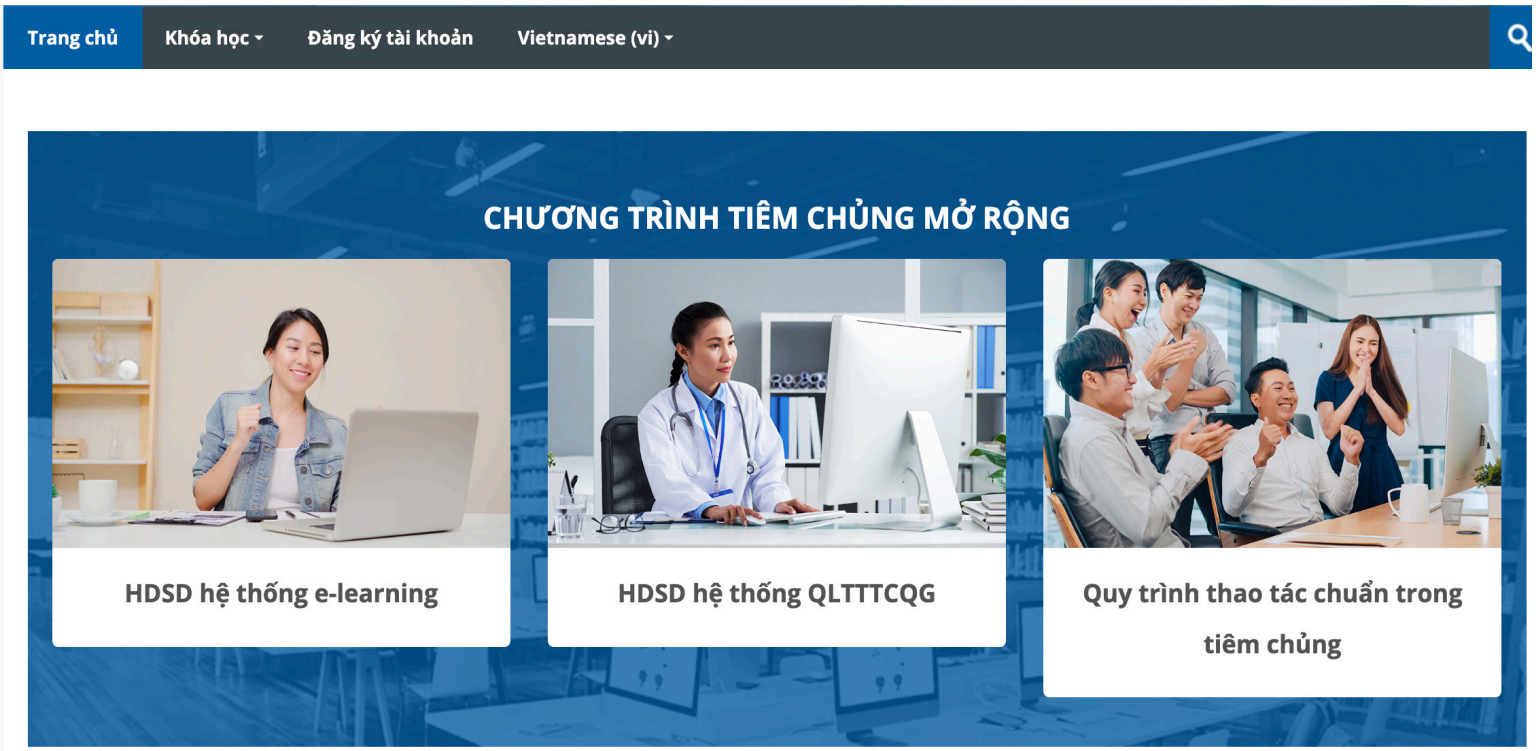
Going beyond the general benefits of e-learning, there were a number of reasons why PATH and NEPI decided to develop an e-learning platform to supplement the in-person trainings for the NIIS.

- ***The NIIS is updated frequently.*** However, provincial and district levels with limited resources, including human resource and budget, cannot conduct in-person trainings to update end users each time the system is updated. For provinces/districts that have enough budget and human resource to conduct in-person trainings for end users, training for the facility level are usually limited to only two people per facility. With an e-learning platform, developers are able to use one platform to update the online trainings so they reflect the system updates, instead of organizing new trainings to share the changes, and all health workers at facilities can access the courses.

- Especially at the commune health center level, the health care system in Vietnam experiences ***high levels of staff turnover***. With only in-person trainings, it would be difficult to train all new staff in a timely manner. Now, all new staff are able to go through the NIIS e-learning modules as part of their work orientation.

- ***Internet connectivity*** in Vietnam is very common, almost universally available, and higher than many other low- and middle-income countries. Using this development as an advantage, e-learning builds off of the network and hardware infrastructure already in place.

- While e-learning was always planned as part of the IDEAL project, ***the COVID-19 pandemic*** sped up its development and deployment. Due to social distancing restrictions, PATH and NEPI staff could not travel at all. This meant there could be no supportive supervision, no in-person meetings, and no in-person trainings. In an effort to adapt to the needs at the time, IDEAL staff focused on the e-learning platform, so NIIS trainings could continue.



E-LEARNING PLATFORM DEVELOPMENT STEPS

Building a platform for e-learning requires significant time investment in order to design, test, and deploy a system that not only meets learning objectives but also meets user needs and requirements. There are several steps that need to be considered:

01 Conduct a ***needs analysis*** analyzing three criteria: audience, content, and technology. The needs analysis has to consider who the learning is for and what the priority learning topics are, taking into account the roles, responsibilities, IT skill, and professional qualifications of the target group. It should also study what technology would be the best to host the platform based on the needs of the group.

02 Using the outcomes of the needs analysis, ***build a curriculum*** with core themes for each course. The curriculum needs to be agreed upon by relevant stakeholders.

03 Once the curriculum is approved, the team should ***design detailed lessons***. The lessons should be accurate and engaging for online learners. These include the development of a layout, visual script, audio script, and information on time allocation. Again, the team should receive feedback from stakeholders before finalizing.

04 Then, ***develop the lessons***. This is often the most time-intensive step, and it requires a lot of creativity.

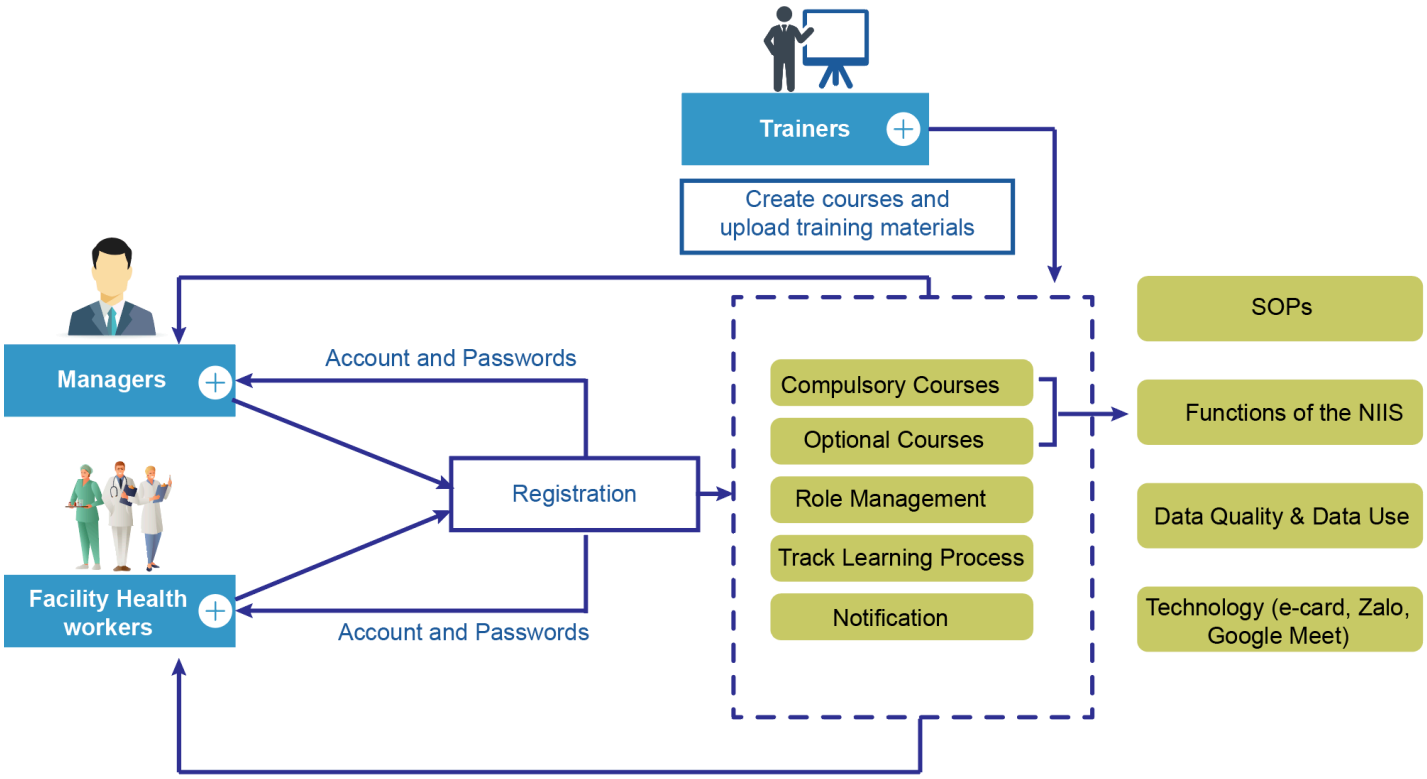
05 The technical team must ***test and edit*** before the product is finalized. This requires feedback from all stakeholders, including beneficiaries.

06 ***Integrate into the platform ongoing user feedback collection*** to continue to improve the system.

E-LEARNING DESIGN AND MANAGEMENT

For the e-learning platform, developers used Moodle, a commonly used, open-source, international platform. Content for the courses was pulled from the training materials developed by PATH and NEPI, which are usually used during in-person trainings. These were converted using a variety of tools, such as videos, PowerPoint presentations with voiceover, motion graphics, and screen video recordings. Each module has a quiz at the end to ensure participants are engaging with and taking in the information presented.

End users set up accounts and go through courses at their own pace. Supervisors and the Expanded Program on Immunization (EPI) manager can assign specific staff courses as mandatory to complete, and they can then track employees' progress in those courses. Users can elect to take other courses for their own personal development if they are interested in the subject matter. Moodle tracks users' progress in the course, and it sends users course deadline reminders.



Initially, the subject matter concentrated only on the NIIS, but eventually other courses were also added. There are over 30 modules spread across four thematic areas: (1) introduction to e-learning, (2) NIIS, (3) routine immunization, and (4) IT skills. In the future, it is the hope of the IDEAL project members that the scope of the platform will expand to include other subject matter.

HANOI AND SON LA E-LEARNING PILOT

Once the platform was developed, the e-learning platform was piloted as part of the IDEAL project in the two project sites, Hanoi and Son La Provinces. These provinces represent both urban and rural geography, with diverse populations and differing infrastructure needs that reflect these realities. Son La is a mountainous province with remote or hard-to-reach areas, and people who live there face some hardware and network challenges. Hanoi is home to the capital city. It is well equipped in terms of infrastructure, but it has a higher percentage of fee-based immunization facilities, where NIIS requirement has posed the challenges of dual system operation.

RESULTS

After one year of implementation, the IDEAL project conducted a small-scale (n = 106) assessment of end users to measure perception of acceptability, feasibility of scale-up, and challenges of the platform. This was conducted via an online survey due to COVID-19 social distancing restrictions.

ACCEPTABILITY

- 100 percent of facilities in Son La and 96.6 percent of facilities in Hanoi reported using the e-learning platform.
- More than 95 percent of survey respondents reported that the system was helpful for them to learn and update their skills.
- Only two people in Hanoi did not use the e-learning platform. These respondents are older and reported not feeling comfortable with IT in general.
- More than 95 percent of survey respondents reported that the system can save financial and human resources associated with in-person trainings.

FEASIBILITY FOR SCALE-UP

- 98 percent of respondents reported that the e-learning system could be replicated at other facilities in other provinces.
- Respondents suggested that the system could be expanded to other health programs, not only focusing on immunization.

CHALLENGES AND LESSONS LEARNED

- While training materials were available, converting them into e-learning courses required voice recording, animation, design, interacting functions, and packing them in the Sharable Content Object Reference Model (SCORM, a collection of standards and specifications for web-based electronic educational technology). Resources need to be allocated for a third-party company to develop them. E-learning courses can also be developed from a simpler PowerPoint video with voiceover. Regardless, in-depth training on e-learning course conversion and adaptation for management level staff who are assigned as instructors of the courses is essential.
- Voice talent recruitment and voiceover for the presentation, though it provides better quality and more interesting recordings, posed a challenge for updating content. When just a minor section of the course needs to be updated, voiceover would need to be re-recorded, which often delays the progress of course development. PATH has explored artificial intelligence (AI) service to transform the scripts to voice to ensure the consistency throughout.

- System overload can occur as an increasing number of learners log in and learn at the same time. As e-learning is under consideration to scale up, its scope and its estimated users should be taken into account for appropriate servers and bandwidth requirements as well as the system capacity evaluation. Moreover, users' classification and assignment for different regions and levels are needed to ensure the system functions properly. With the long-term goal of making e-learning the official training platform, it would have to go through evaluation and approval from the Ministry of Health. It is hoped that this platform can provide the required certification for users/learners with the same credibility as in-person certification.

- Health workers had limited skills, particularly older staff; thus, constant training or readily accessible materials are essential for them to horn these skills. E-learning was built on the web-based platform that can be accessed on a computer or smartphone web browser. It is also more user-friendly. Furthermore, the system continues collecting feedback from users to improve its interfaces, course content, and other matters related to the system implementation process.

- The system is not suitable for trainings on clinical and practical topics. Implementers need to clearly understand that e-learning cannot replace in-person training systems completely. This platform is compatible for training related to health information system training, timely updates on official guidelines, or more conceptual content. E-learning provides additional and more flexible access as well as cost reduction for training.

- Respondents need to be highly proactive and disciplined to go through the courses on top of their other workload. Course content should be designed with lively pictures and interesting and interactive features to ensure learners' engagement. Furthermore, official documents from the management level to encourage e-learning participation or furthering the e-learning platform's legitimation with official certification for staff's performance evaluation will strongly motivate staff to engage more with the platform.

NEXT STEPS

- The e-learning platform, now that it has been developed, **can be expanded** to include other topics beyond just immunization. For example, guidelines, policies, and priorities have changed repeatedly during COVID-19 vaccine deployment in Vietnam, due to changing epidemiological conditions of the virus, vaccine types and supplies, disease prevalence and vaccine coverage, and understanding and findings from current studies. And a US Agency for International Development (USAID)–funded project has explored e-learning as an effective channel for immunization staff and health care workers to have quick, equal access to the most up-to-date knowledge and practices throughout the country.[8]

- Going forward, e-learning is a promising option to be used in the **introduction of digital systems** and software and in keeping people up to date on changing guidelines.

- E-learning platforms can be used to **bridge the gaps created by limited resources** in terms of time, funding, and manpower, providing more equitable trainings to health care staff regardless of location.

- It is important to note that e-learning is probably **most effective when used in conjunction with in-person trainings.** E-learning can be used as an introduction or a refresher, but both are needed for optimal outcomes.

- In the future, **a costing evaluation** for an e-learning platform encompassing system development, maintenance, and upgrades would be key in supporting decision-makers in their effort to scale up the program.

- To measure full effectiveness, it would be advisable to complete **both a baseline and endline evaluation** of the e-learning platform.

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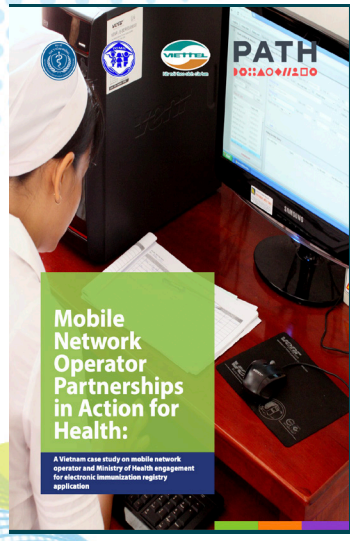

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