

# DIGI4ME

## TRAINING GUIDE FOR HEALTHCARE EDUCATORS

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V1.1

HEALTH SECTOR SKILL  
ALLIANCE FOR CREATING  
INNOVATIVE AND EFFICIENT VET  
PROGRAMMES AND IMPROVING  
THE DIGITAL SKILLS OF MEDICAL  
PHYSICS AND HEALTH  
PROFESSIONALS

WP7 DISSEMINATION,  
EXPLOITATION, SUSTAINABILITY



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# Health sector skill alliance for creating innovative and efficient VET programmes and improving the digital skills of medical physics and health professionals

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### WP7 Dissemination, Exploitation, Sustainability

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## DIGI4ME Project Consortium

Role	Name	Country
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Partner	Hochschule 21	Germany
Partner	International Network for Health Workforce Education	Cyprus
Partner	University of Cyprus	Cyprus
Partner	UNICERT	Greece
Partner	University Politehnica of Bucharest	Romania
Partner	Romanian Foundation for Medical Lasers	Romania
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CYPRUS ASSOCIATION OF MEDICAL  
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## Introduction

This training guide equips the reader with the essential tools required to implement the DIGI4ME training program in their institution. It provides the reader with a comprehensive outline of the project's foundations and the background research required to create the digital skills curriculum, along with the core principles supporting the selection of the program's components. The framework is detailed and provides a roadmap to implementation, allowing educators to transfer the knowledge from the Digi4Me project into their own institutions and country contexts. The implementation guide also explains how our resources can be effectively used in various educational settings, including classrooms, online platforms, and blended learning approaches.

DIGI4ME responds to the pressing need for enhanced digital skills within the healthcare sector by establishing a platform for digital skills training. This initiative fosters the exchange of expertise, experience, and accessibility among EU Educational Institutes, Vocational Education and Training (VET) institutions, Health Care Associations, and relevant EU Enterprises. The ultimate objective is to amalgamate these elements into a cohesive, high-quality training framework that advances digital skill development across European countries, addressing the current gap and aligning healthcare professionals with the technological advancements in the field.

## Theoretical Foundations

The methodology employed in the DIGI4ME project to identify the needs assessment and build the training curriculum consists of three main components: a literature review, a survey, and interviews. These components are outlined below:

### Literature Review

A scoping review method was used to explore literature sources in relation to the aim outlined above. This method has become an increasingly popular approach for identifying and collating research evidence in a specific field of interest (Pham et al., 2014; Sucharew and Macaluso, 2019). It is suited to examining both the breadth and depth of available literature in terms of volume, nature, and characteristics to present a narrative or descriptive overview. It has become an increasingly common approach for mapping broad topics (Arksey and O'Malley, 2005). The scoping review differs from a systematic review in that it incorporates all study methods and designs, as well as all types of literature sources, including published, 'unpublished,' and 'grey' literature. It does not seek to evaluate the quality of studies or research findings, but it does follow the principles of systematic reviews, ensuring that reviews are robust and documented with sufficient detail to be replicable, reliable, and valid, particularly as there is potential for bias due to selective inclusion criteria (Arksey and O'Malley, 2005; Grant, 2009; Munn et al., 2018). Thus, this method is best suited for the overall objective of this task.

In order for the Literature Scoping Review search to be successful, it was important to explore both academic peer-reviewed articles along with grey literature. Grey literature can be found in many forms such as government and non-governmental reports, conference presentations and projects, industry standards, documentation (from private or public sector), and other official documentation (Alberani et al., 1990). To search for all available literature effectively, Booth's (2013) triple plus strategy was implemented. This strategy provides a systematic method for searching literature. Firstly, Google Scholar was used for academic sources. Secondly, a specialist grey literature database (OpenGrey) was searched, and then thirdly, supplementary strategies were examined, including a standard Google search and the websites of large international organisations (WHO, OECD, European Commission, etc.).

Although an extensive literature review has been conducted using multiple methods and multiple sources such as academic databases, grey literature databases, internet research, and through the websites of international organisations and institutions, the results were limited in number but rich in interpretable data. At the same time, the complexity of digital skills in the field of healthcare was recognized in the literature, especially in relation to the considerable number of digital technologies used by various professional groups. This complexity and the considerable number of digital technologies and applications in e-health have led to the creation and implementation of many different approaches to digital education and skill development for professionals, resulting in significant gaps in the cognitive background of professionals. There is an urgent need in the literature to bridge the knowledge gaps through planned investment in the training of professionals using a multidisciplinary approach, as well as for their lifelong training in digital skills. However, the difficulty of determining the appropriate digital skills for each healthcare professional group was



recognized, particularly for those groups that need to possess a large number of skills to effectively perform their duties.

## Delphi Survey

A Delphi study methodology was employed to determine the extent to which stakeholders agreed about a given digital skill or issue. A Delphi study is typically conducted through questionnaires to collect data and develop a consensus over ideas, concepts, or processes. Consensus research methods are often useful in the development of policies and recommendations, as aimed for in this report. Conclusions carried more weight than those from a less formal decision-making process, such as a focus group or a survey questionnaire. The first round of data collection involved synthesizing statements and questions that formed the basis for the questionnaire. An initial scoping review of the literature had been conducted prior to the project's start date, and further examination of the literature was ongoing when the questionnaire was being developed. Participants were recruited from stakeholders in relevant healthcare or educational settings, adopting a multi-professional outlook. Introductory emails were sent to selected participants, along with targeted social media posts containing embedded links to the Digi4Me website. Initial contacts were asked to forward the email to other key individuals in their organization or networks. Individuals expressing interest were able to access the questionnaire and complete it anonymously.

The survey questionnaire was conducted among three major groups of health workers, taking into account the data obtained from the literature review, namely, a group of the most related professionals, a group of related professionals, and a group of supporting professionals. This grouping approach, as well as the structure of the questionnaire itself, had been designed, taking into account the information provided by the literature review. The survey confirmed the literature in relation to the existence of significant cognitive gaps in all professional groups and in all subjects related to digital skills. Our analysis showed that the knowledge gaps for the related and most related professions were mainly located between the basic level and ordinary task handling and the advanced and expert level. Moreover, for the supporting professions, the gap was mostly identified between the no knowledge level and the skills required to fulfill basic tasks. It was also found that the required knowledge and the relative extent of this knowledge for health professionals to effectively perform their duties differed substantially among different professional groups.

## Interviews

The interviews provided additional depth to the theoretical foundations of the project and identified and analysed the existing research evidence on digital skills, digital competences, and qualifications of health professionals. Interviewees were asked a number of questions to support partners in collecting and specifying current innovation needs in the health domain. Online and face-to-face interviews with employers and professionals in the health sectors were conducted, as they offered advantages in terms of data quality in the context of a project of this nature. Semi-structured interviews were held with educators and practitioners from various healthcare domains, sectors, and professions. These interviews focused on the stakeholders' accounts of their personal and practical experiences of using and teaching digital skills in practice and to healthcare students. These particular stakeholders were selected for interviews as they were the most likely to hold the greatest insights into the digital skills of

the health workforce. Semi-structured interviews were chosen because they "were conducted on the basis of a loose structure consisting of open-ended questions that defined the area to be explored, at least initially, and from which the interviewer or interviewee could diverge to pursue an idea in more detail" (Britten, 1995, p. 251). Miles & Gilbert (2005) also pointed out that using semi-structured interviews offered a great way of finding out 'why' rather than 'how many' or 'how much.' Thus, including semi-structured interviews in the research design of Digi4ME provided an additional layer of understanding (Gubrium & Holstein, 2002). Not only did the project reveal what kind of digital skills were missing, but it also investigated some in-depth cases addressing the questions of how and why these gaps in knowledge existed.

The interviews were very constructive, as health professionals were given the opportunity to more easily understand the questions asked and to provide in detail their needs for the acquisition and application of digital skills. The process of interviewing with professionals established the fact that digital skills were required in modern healthcare services not only to perform specialized tasks but also to fulfill basic daily straightforward tasks. Furthermore, as the multidisciplinary approach had been recognised as an essential factor for quality healthcare services, collaboration and networking between professionals, even of the same specialty for additional consultation, became increasingly important. The development and maintenance of the required digital skills in healthcare became, therefore, a necessity.

These interviews had, in many cases, identified the interest of health professionals in digital skills that they acknowledged they did not possess. In other words, it seemed that even though in their careers they did not have the opportunity to acquire certain specialized digital skills, they were nevertheless able to recognise their usefulness. In addition, interviews showed that health professionals were able to identify digital skills which, in their view, were either not useful in everyday practice or required a disproportionate training effort in relation to the benefits of implementing this knowledge. In such cases, the need for the development and application of certain specialised digital skills was only recognised for certain groups of health professionals who, due to their academic background, could put these skills into everyday practice with reasonable effort.

## Framework of the Training

The background research for the project has shown that the type and extent of digital skills development needs differ among various professional groups. Education, training, and maintenance of digital skills should be tailored to the needs of each group. Data analysis in the context of this project indicates that the strategic goal for digital skill development and maintenance should be adjusted based on the relevance of professional groups. Hence, the strategic goal for supporting professionals should aim to move approximately 43% of workers with no knowledge of digital applications towards being able to perform simple tasks with or without guidance. The 52 workers in the category of relevant professions with limited or no knowledge should be trained so that they are at least able to perform straightforward tasks. Finally, the workers in the most relevant professions should be enabled to perform at an advanced and even expert level at a considerably higher rate than the approximately 9% (all questions mean value) registered in this project.

There is a considerable number of digital skills that need to be developed among different collaborating professional groups; therefore, designing and providing education and training, as well as maintaining the appropriate digital skills for each group, becomes a complex procedure. Healthcare professional groups should receive standardized training, and their skills should be continuously updated through a certification process. The provision of standardized training requires central management to achieve uniformity across Europe. The curriculum of this training should include, but is not limited to, the following main categories/subjects:

- Hardware Interaction
- Using the Internet and the Cloud
- Project management, collaboration, and sharing
- Data management and analysis
- DICOM and Image processing
- Data protection and information security

## Curriculum Overview

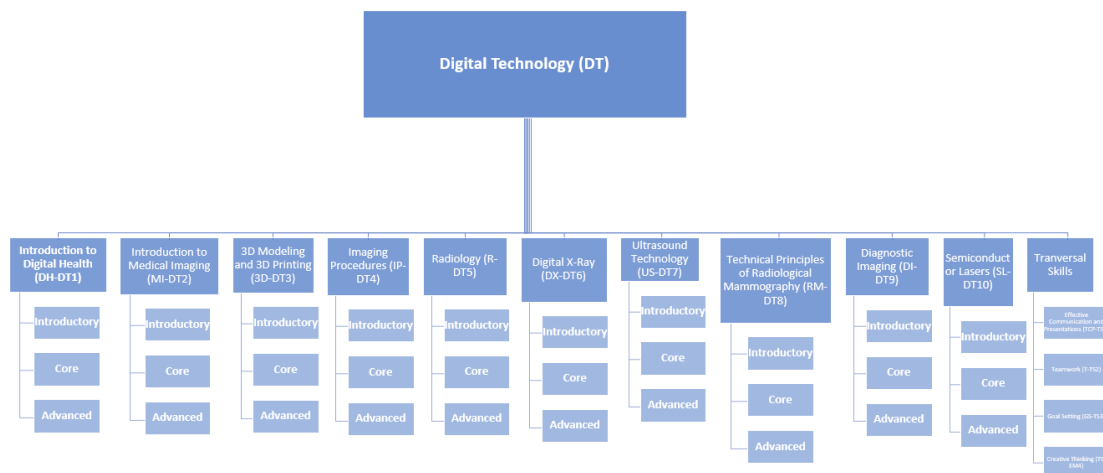
The curriculum comprises four areas, each containing a number of modules at beginner, core, and advanced levels:

- Digital Technology (DT)
- Health Data Science (HDS)
- Healthcare & Safety (HS)
- Transversal Skills (TS)

Each subject area is summarised below:

### Digital Technology (DT)

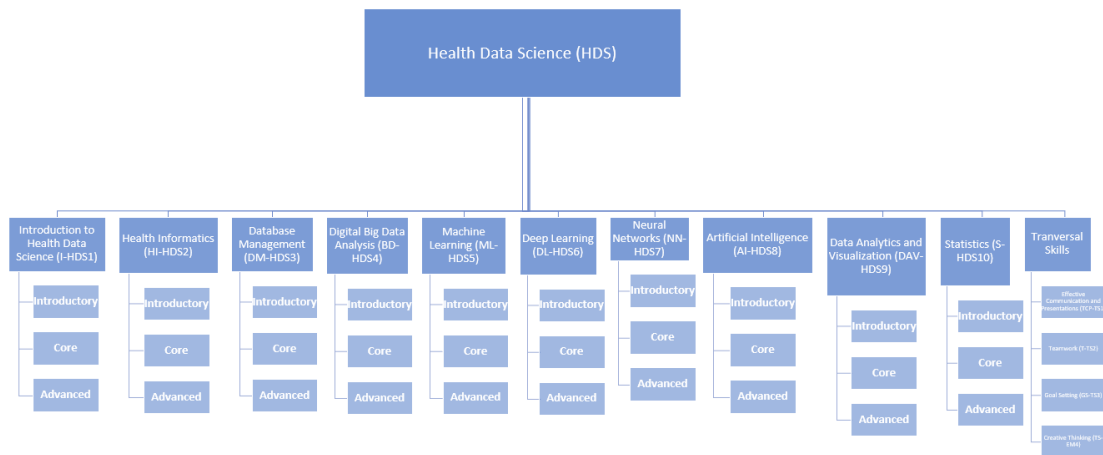
These educational modules within the Digital Technology (DT) field cover a range of topics. Learners are introduced to digital health, medical imaging techniques, 3D modeling and printing, imaging procedures, radiology, digital X-ray technology, ultrasound technology, mammography principles, diagnostic imaging, and semiconductor lasers. Each module aims to provide learners with a comprehensive understanding of its respective subject matter, including relevant techniques and applications. Throughout the modules, learners engage with quizzes to apply their newly acquired knowledge and skills.



### Health Data Science (HDS)

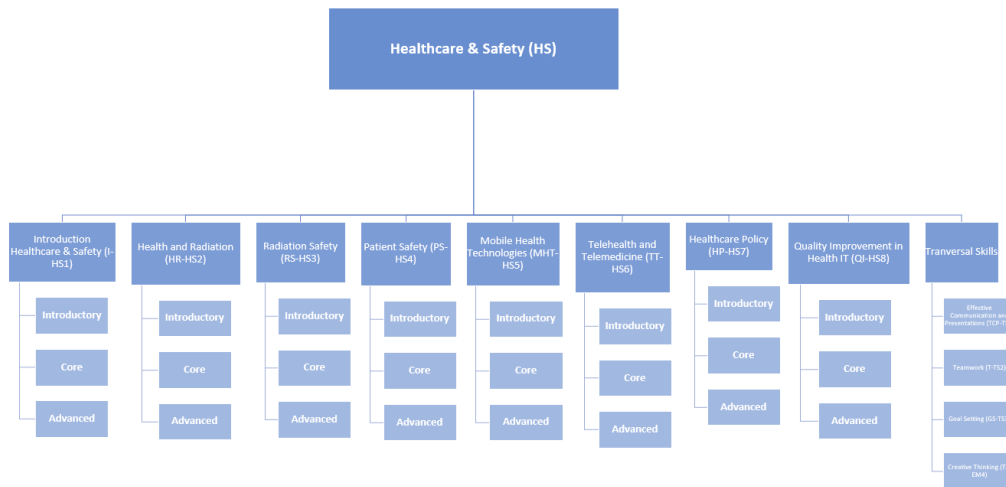
The Health Data Science (HDS) modules cover a wide range of topics in data science applied to healthcare. In the "Introduction to Health Data Science," learners are introduced to the concept and applications of health data science. "Health Informatics" delves into the use of informatics skills and knowledge in health-related problem-solving. "Database Management" focuses on relational databases and data visualization for decision-making, while "Digital Big Data Analysis" deals with analyzing clinical data's unique challenges. "Machine Learning" explores machine learning in healthcare, and "Deep Learning" introduces deep learning methods in healthcare applications. "Neural Networks" teaches the training of convolutional neural networks, and "Artificial Intelligence" relates AI to healthcare problem-solving. "Data

"Analytics and Visualization" cover data mining and visualisation in healthcare settings, and "Statistics" delve into key statistical concepts and the use of R for statistical analysis, visualisation, and machine learning. Each module includes quizzes to assess and apply newly acquired skills and knowledge.



## Healthcare & Safety (HS)

The Healthcare & Safety (HS) modules encompass a diverse range of topics. "Introduction to Healthcare & Safety" familiarizes learners with knowledge and skills essential for leading patient safety and quality improvement initiatives. "Health and Radiation" introduces ionizing and non-ionizing radiation materials and their safe management. "Radiation Safety" delves into various radiation types and safety management for X-ray systems. "Patient Safety" equips healthcare practitioners with skills for patient safety and quality improvement initiatives. "Mobile Health Technologies" explores the use of mobile and wireless technologies in healthcare. "Telehealth and Telemedicine" focuses on designing and implementing successful telemedicine programs. "Healthcare Policy" covers global health problems, health governance, and policy analysis. "Quality Improvement in Health IT" delves into complexity and quality improvement in health and social care. Each module includes quizzes for learners to apply their newly acquired skills and knowledge.



## Transversal Skills (TS)

Transversal skills typically have high transferability across different jobs and sectors. Transferable skills are essential on many levels and are crucial for building a public sector career path, as they enable individuals to transition between roles, departments, or organisations. These skills aim to build upon academic and experiential learning and prepare health professionals for engagement within the business environment in a creative manner, effective communication with the internal and external environment of a business, and collaborative actions.

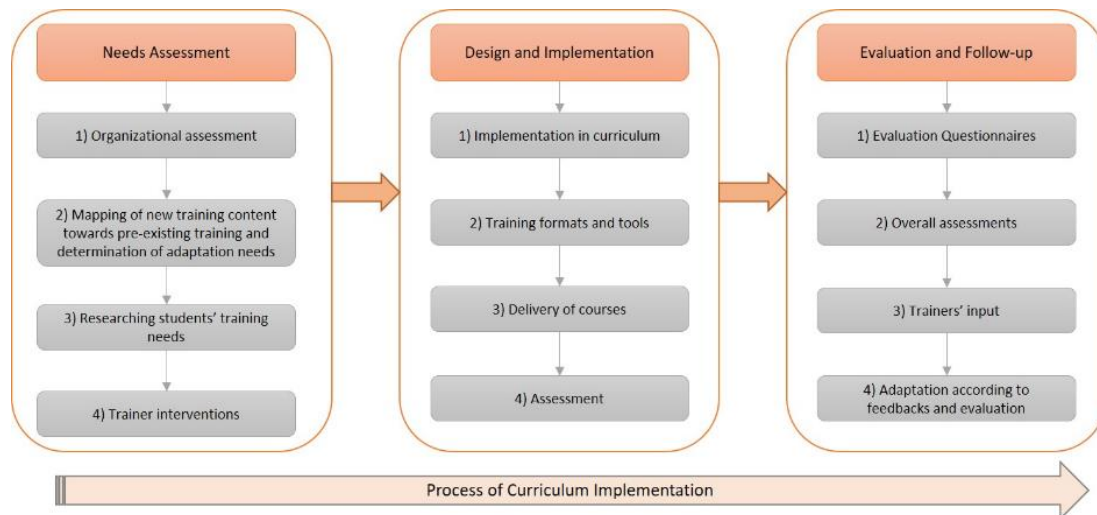
We will introduce modules that provide a portfolio of skills and competencies required for effective communication and presentation, teamwork, goal-setting, and creative thinking.

## Curriculum Implementation

Constructive alignment (CA) (Biggs, 1996; Biggs, 2014) approach is the foundation of the methodology used to design the Digi4Me VET curriculum. Constructive alignment (CA) is an outcomes-based approach to teaching, in which the learning outcomes that students are intended to achieve are defined before teaching takes place. Teaching and assessment methods are then designed to best achieve those outcomes and assess the standard at which they have been achieved. Constructive alignment is a design for teaching in which what students are intended to learn and how they should express their learning is clearly stated before teaching takes place. Teaching is then designed to engage students in learning activities that optimize their chances of achieving those outcomes, and assessment tasks are designed to enable clear judgments as to how well those outcomes have been attained (Biggs, 2014, pp. 5-6).

The integration of this course into undergraduate or postgraduate settings holds immense potential across a wide array of educational environments. It stands as a pivotal factor in propelling transformation within healthcare professionals' digital skill development. A structured digital skills curriculum serves as a valuable compass, guiding students and healthcare professionals through the intricate path of evolving into proficient specialists in today's rapidly changing healthcare landscape.

Health professionals grapple with persistent changes within the systems they operate in and the diverse needs of their patients. Equipping the healthcare workforce with the dexterity to adeptly navigate these transformations is of paramount significance to educators, researchers, and policymakers alike. In our pursuit of effective implementation, we have drawn insights from the work of Thomas et al (2016), amplifying our course's impact.



**Figure 1 Process of Curriculum Implementation**

Additionally, the development of curricula and expected learning outcomes is a dynamic cyclical process requiring reassessment and adaptation over time. The use of learning outcomes is increasingly influencing the design and delivery of vocational education and training (VET), focusing on what a learner is expected to know, be able to do, and understand

at the end of a learning process. The curriculum for digital skills of health professionals consists of three stages:

1. Identification of curriculum goals and learning outcomes.
2. Development of teaching and assessment methods.
3. Review and refinement of the curriculum.

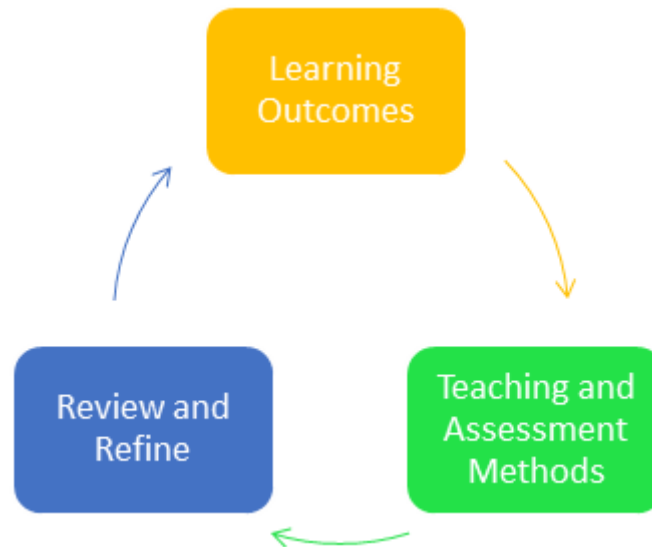


Figure 2: Development of the Health curriculum

## Needs Assessment

Conducting a thorough needs assessment is fundamental to tailoring any training plan to the unique skill set of the student group. An organisational assessment is a pivotal step, ensuring that our course can seamlessly integrate within a specific institution. This assessment should encompass operational factors such as access to computers, appropriate physical space for training, and ensuring educators possess the requisite skills.

The subsequent stages involve aligning the new training content with existing programmes in training and educational institutions. This can be achieved through either a scoping training session or, where available, evaluating learning outcomes in current curricula.

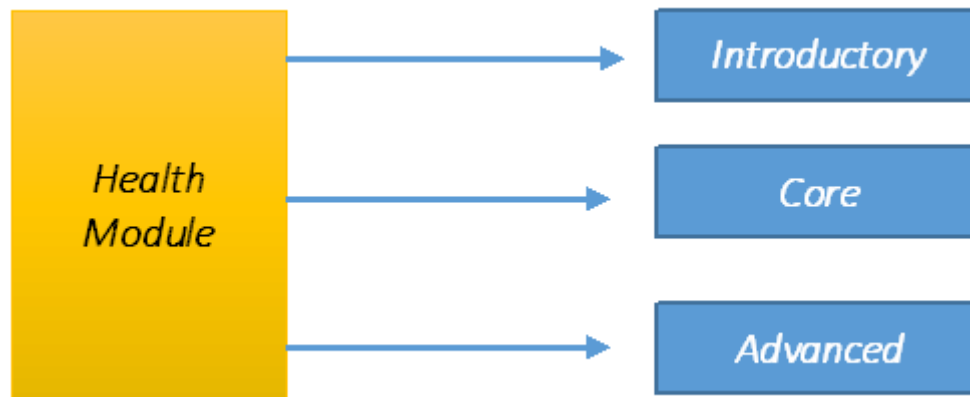
Understanding and identifying the students' training needs represent the final crucial step. Various methods can be employed for this purpose. Conducting interviews with experienced educators within an institution and engaging with the students themselves can provide valuable insights. These approaches shed light on existing training gaps and help seamlessly integrate the training course with ongoing programmes.

## Design and Implementation

The design and implementation phase constitute a pivotal aspect of curriculum execution. This phase emphasises the training formats, tools, delivery mechanisms, and assessment



strategies. Tailoring personalised learning paths and modules based on individual profiles ensures a better alignment with their specialties, knowledge backgrounds, and professions.



*Figure 3: Levels for each Health Module*

Each educational module is structured into three key components. The "Introductory (I)" phase provides an initial module overview, offering essential introductory information. The "Core (C)" section delves into fundamental aspects, principles, and methods with ample depth for practical application. This empowers learners to engage in meaningful discussions with stakeholders and pursue further knowledge as needed. The "Advanced (A)" segment explores intricate aspects in detail, ensuring a comprehensive understanding of the module's content.

Our curriculum embraces a modular approach, meticulously designed to cater to the unique needs of each learner, allowing them to carve out their personalised learning path. It is organised into educational modules and training units, offering flexibility in application and execution. This adaptability grants educators the freedom to implement the course in a manner that best suits the specific needs of their students, institution, or themselves as educators. Below we have provided some examples of how the course could be implemented:

*New Module Creation:* Educators are equipped with the necessary tools to craft a brand-new leadership module. The provided scenarios can extend a week's worth of training, enabling an in-depth exploration of the four presented issues. Group work, detailed discussions on learning objectives, key questions, and leadership attributes within each scenario can be integrated. Additional modules and discussion points can further enrich the learning experience

*Integrated into Existing Module:* The training course seamlessly integrates into existing courses, modules, and curricula. Health training programs can be enriched with our tools, fostering high levels of student interaction, teamwork, and discussion. Educators can select from the four scenarios or tailor their choice to suit the current course. For instance, the imperative for digital skills in health and safety can be seamlessly added to relevant existing courses.

*Independent Workshop:* The training program functions effectively as an independent workshop with a student group. It can either stand alone as a session or complement an



existing program. The workshop duration can vary, offering learners an opportunity to fully immerse themselves in a part or the entirety of the course, ranging from half a day to a week.

By developing a versatile course applicable in various formats, our aim is to enhance learner interactivity and engagement with educators. The utilization of real-life scenarios fosters an advanced and/or expert level of leadership capabilities among learners.

## **Evaluation and Follow Up**

In the concluding phase of the implementation period, it becomes imperative to establish a consensus on how to effectively gauge the impact and sustainability of the new program. This step is vital in comprehending shifts in the attitudes and skills of students, understanding how they have evolved, and devising suitable evaluation mechanisms. Program evaluation is a linchpin for informing future enhancements, ensuring continuous alignment with learners' evolving needs.

Several evaluation models exist, and selecting an approach that harmonizes with the students, educators, and the institution is crucial. Reflecting on the nature of the evaluation is pivotal, contingent upon how the course has been implemented. A comprehensive training course introduced as an entirely new module within a program warrants a more extensive evaluation compared to integrating a supplementary workshop into existing curricula.



## Curriculum Review and Update

The sustainability of the training program will be achieved through update and review by INHWE as work package leader. It is the duty of the WP lead and the wider project consortium to offer remote training and maintain all the training material mentioned in this guide. UBP as host of the website and online repository will be responsible for quality assurance and evaluation of the online materials as well as having overall responsibility for the entire training program (along with University of Cyprus). INHWE will also continue to promote the training course and run regular workshops at events in the future.



## References

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