

# Online Education for Vaccination Competence Among Health Sciences Students

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**Abstract.** The EDUVAC project aims to develop and implement a web-based course on educating vaccination competence among health sciences students. In the current study students' feedback and evaluation is assessed which guided the partners' efforts to improve the final course content and learning material that will be available for open access. After completing the web-based course, most of the students (N=103, 75.1%) perceived their vaccination knowledge was up to date and their overall participating experience was "above average or excellent (N=119, 86.9%). While, almost all of the students (N=127, 92.7%) found that the web-based course has benefitted them and their future career. Our findings support that

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the web-based courses can provide satisfactory learning experience to University students and offer flexibility when needed especially in times that remote education is the only option.

**Keywords.** Vaccination, online learning, web-based course, students

## 1. Introduction

Immunization is without any doubt one of the most effective preventive interventions in public health of the past century [1]. By vaccination the body's immune system resists to viruses and other pathogens and can offer protection against several infectious diseases hazardous for life [2]. It is estimated that every year two to three million deaths are prevented because of certain vaccination strategies to increase immunization coverage [3].

Although vaccination is sometimes treated as no more than a simple injection, health professionals who implement vaccinations should be authorized to administer vaccines, have distinctive personal qualities, theoretical knowledge and practical skills [4]. Thus, in order to address the need of education on vaccination competence, the Erasmus+ funded project "Educating Vaccination Competence" (EDUVAC) was established. The overall aim of the project is to increase knowledge, skills and attitudes for vaccinations of future health professionals, in order to improve the vaccination coverage of different population groups [5]. More specifically, a 3 ECTS web-based course is developed (see: [www.eduvac.eu](http://www.eduvac.eu)), since, the benefits of the e-learning courses are well supported in literature [6] as a person-centered method of learning in aspect of higher access in education, flexibility, interaction, efficacy and knowledge. To our knowledge this is the first vaccination competence program for students that it is implemented through online learning.

The aim of the current paper is to present the students' feedback and evaluation of the developed web-based course which guided the partners' efforts to improve the final course content and learning material that will be available for open access to every stakeholder worldwide.

## 2. Method

Students from the five partners Higher Education Institutes (HEI): University of West Attica, Greece (coordinator); Metropolia University of Applied Sciences, Finland; Trnava University, Slovakia; University of Vic, Spain and University of Modena and Reggio Emilia, Italy, participated in the EDUVAC web-based course that was run twice (Spring 2019 and Autumn 2019) in English using the Moodle platform.

The digital content of the web-based course consisted of 6 sections: 1) vaccination basics, 2) vaccination procedure, 3) counselling the clients, 4) vaccinating refugees, migrants and asylum seekers, 5) vaccinating travelers and people on the move, 6) anti-vaccination groups and clients who hesitate to take vaccines. The content and learning material were developed in collaboration with all five project partners HEIs.

The asynchronous web-based course offered several self-study learning activities, such as PowerPoint presentations, narrated presentations (PowerPoint with audio), videos, documents in text or pdf format, quizzes, self tests, learning assignments, links and other material for further reading. Students' final evaluation was based on the submitted portfolio assignments uploaded in Moodle.

Data was collected by participant students at the end of the courses using a digital questionnaire with close-ended questions (demographic characteristics, knowledge, evaluation) and an open-ended question asking about comments, suggestions and further feedback. The questionnaire was developed for the aims of the current study based on review of relevant literature. The approval was obtained on 12.03.19 by Metropolia University of Applied Sciences which hosted the web-based courses and by other Universities when required. Statistical analysis was performed using SPSS version 21.0 and descriptive statistics is used to present the results.

### **3. Results**

The number of participant students in the EDUVAC web-based course was 186 and 137 of them answered the digital questionnaire, which corresponds to a response rate of 73.65%. Most of them (N=125, 91.2%) were females and the majority belonged at the age of 18-25 (N=113, 82.5%), while, there was a small number (N=22,16%) of students at the age of 26-40 years old. Additionally, some students (N=26, 19%) had a previous qualification in health care.

In regards on how they would perceive their knowledge gained from the web-based course, on a scale 0-10, most students (N=103, 75.1%) perceived their vaccination knowledge as up to date with rates between 8 and 10. In addition, considering their responses about being aware of different vaccination schedules and be able to find the different schedules targeting different populations group's, the majority of students (N=108, 78.8%) said that they have "largely or fully achieved" it and in the question if they find that "vaccinating is an important health promotion method", approximately all of them agreed (N=133, 97.1%). Moreover, most of the students (N=99, 72.3%) believe that they have "largely or fully achieved" to feel more confident in the use of the English language.

Concerning students' satisfaction of the web-based course, several aspects were evaluated by most as "above average or excellent": the organization of the course (N=109, 79.6%), the students' manuals/guides (N=91, 66.4%) and the information available in advance from teachers, such as e-mails, information and info sessions in classroom (N=94, 68.6%). They also evaluated the learning activities overall "above average or excellent" (Table 1).

Finally, most of them (N=119, 86.9%), reported that the overall experience was "above average or excellent" and almost all of them (N=127, 92.7%) think/feel the web-based course has benefitted them and their future career as well as they would encourage other students to attend this web-based course.

### **4. Discussion**

The findings of the current study had a good impact in the students' knowledge as they perceive it and they were overall satisfied as well as with the different learning activities included in the web-based course. These results are in line with previous studies that have shown that online learning can improve knowledge, skills, attitudes and satisfaction and is more effective and beneficial for the students of health professionals comparing with traditional teaching [7,8]. Students' satisfaction is also recently supported [9] as one of the foundations for student-centered education.

**Table 1.** Students' evaluation of learning activities

	Above Average or Excellent		Below Average		Poor		Don't know	
	N	%	N	%	N	%	N	%
<b>PowerPoint Presentations, narrated presentations (PowerPoint with audio)</b>	155	83.9	18	13.1	2	1.5	2	1.5
<b>Videos</b>	101	73.7	24	17.5	10	7.3	2	1.5
<b>Quizzes, self-tests, learning assignments</b>	118	86.1	9	6.6	3	2.2	7	5.1
<b>Documents in text or pdf format</b>	126	92	7	5.1	2	1.5	2	1.5
<b>Links to other material</b>	129	94.2	6	4.4	1	0.7	1	0.7

Paechter et al. [10] emphasize the considerable role of the teachers and their contribution in e-learning process from the aspect of learning outcomes and satisfaction. This is reflected also in the results of the current study that the students' manuals/guides, the information available in advance from teachers, such as e-mails, information, info sessions in classroom were all assessed by most students as "above average or excellent".

In addition, this web-based course gave the participants the opportunity to study in English while in general they study in their mother tongue, and after the course, most of them feel more confident in the use of the English language as it is supported by researchers [11], e-learning could be helpful for students to learn English.

Finally, researchers have concluded that e-learning has a positive influence on students' fulfillment in education [12] which is supported by the current results as almost all of the participants found that the web-based course has benefitted them and their future career and they would encourage other students to attend this web-based course.

Data was collected using a self-reported questionnaire in regards to students' perception of gained knowledge and the overall evaluation of their online learning experience which may be valid for representing their perception but they may not reflect reality and thus, this can be a possible limitation. However, literature supports that students' self-reported learning gain can be useful and valid indicators for their learning [13,14,15]. Finally, students' comments and suggestions which mainly demonstrate that they liked the self-tests, the videos and the narrated presentations as a learning method, are considered for the development and improvement of the final open access online learning material.

## 5. Conclusions

Online education is growing and over time more students for various reasons have the opportunity not to study in a classroom. In addition, due to the recent COVID-19

pandemic, most governments closed temporality educational settings while the education and learning continued remotely. As the current study supports, online learning can give the flexibility to the academic community for effective and satisfactory learning.

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## References

- [1] Expert Panel on effective ways of investing in Health (EXPH), Preliminary report on vaccination programmes and health systems in Europe, Publications Office of the European Union, Luxembourg 2018. Available at: [https://ec.europa.eu/health/expert\\_panel/sites/expertpanel/files/020\\_vaccinationpgms\\_en.pdf](https://ec.europa.eu/health/expert_panel/sites/expertpanel/files/020_vaccinationpgms_en.pdf).
- [2] W.H.O. Vaccines (2020). Available at: <https://www.who.int/topics/vaccines/en/>.
- [3] W.H.O. Immunization (2020). Available at: <https://www.who.int/topics/immunization/en/>.
- [4] Nikula A, Hupli M, Rapola S, Leino-Kilpi H, Vaccination competence, *Public Health Nursing* 26 (2009), 173–182.
- [5] Sakellari E, The need to develop health professionals' vaccination competence, *International Journal of Caring Sciences* 12 (2019), 591.
- [6] Sinclair P, Kable A, Levett-Jones T, The effectiveness of internet-based e-learning on clinician behavior and patient outcomes: a systematic review protocol, *JBI Database of Systematic Reviews and Implementation Reports* 13 (2015), 52-64.
- [7] George PP, Papachristou N, Belisario JM, Wang W, Wark PA, Cotic Z, Rasmussen K, Sluiter R, Riboli-Sasco E, Tudor Car L, Musulanov EM, Molina JA, Heng BH, Zhang Y, Wheeler EL, Al Shorbaji N, Majeed A, Car J, Online eLearning for undergraduates in health professions: a systematic review of the impact on knowledge, skills, attitudes and satisfaction, *Journal of Global Health* 4 (2014), 010406.
- [8] Cook D, Levinson AJ, Garside S, Dupras DM, Erwin PJ, Montori VM, Internet-based learning in the health professions: a meta-analysis, *Journal of the American Medical Association* 300 (2008), 1181-1196.
- [9] Klemenčič M, Pupinis M, Kirdulytė G, Mapping and analysis of student-centred learning and teaching practices: usable knowledge to support more inclusive, high-quality higher education, NESET report, Publications Office of the European Union, Luxembourg, NESET report, Executive Summary, Publications Office of the European Union, Luxembourg 2020. Available at: <https://op.europa.eu/en/publication-detail/-/publication/817b846d-6733-11ea-b735-01aa75ed71a1/language-en>.
- [10] Paechter M, Maier B, Macher D, Students' expectations of, and experiences in e-learning: their relation to learning achievements and course satisfaction, *Computers & Education* 54 (2010), 222-229.
- [11] Haron NN, Zaid YH, Ibrahim NA, E-Learning as a platform to learn English among ESL learners: benefits and barriers, In: M. Stapa, H. Jaafar (Eds): *Research in Language Teaching and Learning*, Penerbit UTM Press, 2015.
- [12] Lahti M, Hätönen H, Välimäki M, Impact of e-learning on nurses' and student nurses knowledge, skills, and satisfaction: a systematic review and meta-analysis, *International Journal of Nursing Studies* 51 (2014), 136-149.
- [13] Jones TL, Self-reported instrument for measuring student learning outcomes, *Proceedings of the American Society for Engineering Education Annual Conference & Exposition*, American Society for Engineering Education, Nashville TN, 2003
- [14] Anaya G, College impact on student learning: Comparing the use of self-reported gains, standardized test scores, and college grades, *Research in Higher Education* 40 (1999), 499-526.
- [15] Porter SR, Self-reported learning gains: a theory and test of college student survey response, *Research in Higher Education* 54 (2013), 201-226.