AN EVALUATION OF STUDENT PERCEPTIONS OF THE EFFECTIVENESS OF MULTIDISCIPLINARY TEACHING AND LEARNING IN EHEALTH

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Abstract

The subject of eHealth is an emerging academic discipline, which in our changing society has been lauded as a potential contribution to the amelioration of some of the problems caused by ageing populations and lower birth rates. The question of how we increase knowledge of eHealth issues, and who is best suited to teach and learn such a multidisciplinary subject is the theme of this paper.

We present an initiative called the eHealth Eurocampus (http://ehealtheurocampus.eu), which is an EU-funded Erasmus+ Strategic Partnership, whose primary objective is to determine the requirements for future eHealth education, and to produce eHealth learning materials that can be used to prepare students for professional life in an eHealth work environment. A total of 10 EU-wide organisations, including Universities, a Hospital, and an eHealth Technology Company form the partnership, and teachers and trainers from each of them have contributed to the development and testing of the project outputs. Also, students from all relevant organisations are involved, most specifically as participants in Summer Schools that have been used to pilot the learning materials. The teachers, trainers and students have backgrounds in a number of disciplines, including: ICT, Engineering, Nursing, Medicine, Business and Occupational Therapy.

This paper reports data that were collected and analysed during one of the Summer Schools, which took place in Wrexham, Wales, UK in the Summer of 2018. The topic of the Summer School was “IT for a Longer Independent Life”, and was attended by 46 multidisciplinary students, and supported by 13 teachers and trainers. The Summer School took place over a two week period, and comprised theoretical teaching, practical laboratory work, interaction with service users (performed by actors), all culminating in the group prototype development of eHealth apps, which were then presented and evaluated by the whole cohort. Students worked in multidisciplinary teams, and their experience of working and learning together was evaluated at the end of the Summer School by way of a survey method.

We present the results of this survey, which clearly demonstrate that the teaching and learning approach was highly appropriate and satisfactory, and that students benefited from working in their multidisciplinary teams. Another positive was that the students appreciated experiencing the different perspectives and approaches of other students and their disciplines, something which we argue is critical for eHealth education to develop and emerge as an academic subject in its own right.

Keywords: eHealth, multidisciplinary teaching, student perceptions

1 INTRODUCTION

When developing novel ideas in education, it makes perfect sense to test and refine those ideas before making significant investment in expensive resources to support such developments. Such is the ethos of the eHealth Eurocampus.

Although in our nomenclature for at least 20 years [1,2], eHealth is still an emerging domain, both in academia and industry. This is perhaps because of the slow adoption of technology in the healthcare sector, for which there are many reasons e.g. patient and clinician reservations over data security, integrity and reduced face-to-face access in primary care [3]. However, as our demographics evolve towards an ageing society [4,5,6,7] traditional resourcing of healthcare is no longer feasible, something that is increasingly acknowledged at executive Government level [8]. Instead, it is argued that technology must play a more significant role in healthcare provision, and that effective multidisciplinary teamwork for the user-centered design and development of health solutions for these challenges should be followed [9].

In recognition of these imperatives, the eHealth Eurocampus aims to help create the eHealth professionals of the future, by empowering them with the knowledge and skills to support a society that will need high-quality, reliable and credible technologies that will be acceptable both to the clinical profession and the patients it supports.

This three-year project is researching, exploring and testing concepts and ideas in a number of eHealth-related areas. The focus of this paper is on how we can develop eHealth apps to support longer independent living, a topic that has had much interest recently, given the projected savings it can bring [10], as well as supporting higher quality of life for the concerned individuals [11]. Specifically, a Summer School was delivered in June/July 2018, entitled “IT for a Longer Independent Life”. This was attended by 46 multidisciplinary students (26 males and 20 females), 15 from Health Studies (Nursing, Occupational Therapy and Physiotherapy) and 31 from Technological Studies (Computer Science, Engineering, Mathematics). They came from 5 European countries: Spain (n=23), Germany (n=6), UK (n=3), Cyprus (n=9), France (n=6) and 8 different sending institutions. The Summer School was supported by 13 teachers and trainers (7 males and 6 females). It took place over a two-week period, and comprised theoretical teaching, practical laboratory work, interaction with service users (performed by actors), all culminating in the prototype development of eHealth apps, which were then presented and evaluated by the whole cohort.

This evaluation is the subject of the present paper. The aim of the evaluation was to examine the formation programme (Summer School), collecting information about content, structure and outcomes, in order to detect aspects of the Summer School that had been successful and areas for improvement. It was of special interest to confirm the hypothesis that a multidisciplinary learning environment in eHealth implied a benefit for all students.

2 METHODOLOGY

The study had a descriptive, quantitative design, according to the formulated objectives. The evaluation followed a classical survey methodology, comprising a series of closed semantically-scaled questions and culminating in a single open question inviting further comment.

The overarching objective of the questionnaire, created specifically for this study, was to evaluate the students’ perceptions of the effectiveness of multidisciplinary teaching and learning in eHealth, which is of particular interest to the Eurocampus project, as we hypothesize that it will be optimal for eHealth professionals of the future to be from hybrid backgrounds (ICT, Medicine, Nursing, Public Health, Engineering, Business, and so forth).

The draft questionnaire was prepared based on the questionnaire used in a previous Summer School (held in Castres, France, 2017). Once finished, it was reviewed by 3 teachers: an expert in demography and public health, an expert in innovation and design of learning spaces and an expert in digital resources. All questions from the previous summer school were maintained, although some of the items were developed into detailed sub-questions, to capture a broader description of students’ experience

The categories of the questionnaire that aim to meet this objective were: the efficacy of the teaching sessions; the teaching methodology; the usefulness of the VLE platform (in this case Moodle); and the effectiveness of the teamwork method. Finally, an overarching question was asked: “According to my expectations, I'm very satisfied with this eHealth Summer School”, followed by the open question

inviting comments. Other questions were asked regarding the local organization and support offered by the sending Institution, but these are outside the scope of this paper. Table 1 summarises the questionnaire.

Table 1: Student perceptions of the effectiveness of multidisciplinary teaching and learning in eHealth questionnaire

1. The theoretical sessions were fruitful/useful
2. Teaching content
2.1 … was appropriate and sufficient
2.2 … was useful for the project development
2.3 … increased my previous knowledge
2.4 … will be useful in my future professional development
3. Teaching methodologies (lectures, lab sessions, exercises, theatre simulation)
3.1 … were appropriate
3.2 … promoted motivation
3.3 … helped content comprehension
3.4 … teachers showed motivation and promoted students' participation
3.5 … promotes critical reflection / thinking
4. VLE (Moodle)
4.1 … it has been a useful tool
4.2 … materials were available in the correct time
4.3 … has been easy to use
5. Teamwork and project development
5.1 … the teamwork was satisfactory
5.2 … we achieved a respectful atmosphere
5.3 … the communication with team members was appropriate
5.4 … we achieved the expected outcome
5.5 … all members were active and participative
5.6 … my own involvement in the project was correct (regarding my subject expertise)
6. According to my expectations, I'm very satisfied with the eHealth Summer School

The closed questions were presented on a Likert scale [12] in which answers were from 1 to 6, where: 1 means "I fully disagree"; 2 means "I disagree"; 3 means "I partially disagree"; 4 means " I partially agree"; 5 means "I agree"; and 6 means "I fully agree". The survey was delivered as an online questionnaire using the Google Forms platform. It was administered at the end of the two-week Summer School period.

Ethical approval for the survey was given following local Institutional procedures. Participants were informed about anonymity and confidentiality as well as being assured that no personal data would be collected, and that the data would be stored in a safe place where only the researchers would have access.

3 RESULTS

There was a 76% response rate, with 35 of the 46 students returning their evaluations. Not all students completed all questions.

The results, expressed as raw data, number of responses (N), mean (μ) and standard deviation (σ) are presented in table 2. Figure 1 shows a graphical representation of the mean rating for each question.

Table 2. Evaluation survey results.

Question	Fully disagree 1	Disagree 2	Partially disagree 3	Partially agree 4	Agree 5	Fully agree 6	N	μ	σ
1	3	3	4	10	11	4	34	4.03	1.45
2.1	1	5	9	6	6	8	35	4.00	1.5
2.2	1	6	8	3	10	7	35	4.03	1.52
2.3	2	4	6	10	5	8	35	4.03	1.50
2.4	2	7	6	8	5	7	35	3.80	1.57
3.1	2	3	8	8	7	7	35	4.03	1.46
3.2	1	4	6	11	7	6	35	4.06	1.35
3.3	1	2	8	10	5	9	35	4.23	1.37
3.4	2	2	4	6	11	10	35	4.49	1.46
3.5	1	2	8	7	7	10	35	4.34	1.41
4.1	0	4	7	4	7	13	35	4.51	1.46
4.2	0	0	5	2	7	21	35	5.26	1.09
4.3	1	0	5	1	11	17	35	5.06	1.26
5.1	0	0	2	4	10	17	33	5.40	0.91
5.2	0	1	4	0	5	25	35	5.20	1.14
5.3	0	1	4	3	6	21	35	5.11	1.18
5.4	0	1	4	3	9	18	35	4.97	1.16
5.5	0	2	4	6	4	19	35	5.27	1.32
5.6	0	0	0	3	18	14	35	5.31	0.63
6	0	0	3	7	11	14	35	5.03	0.98

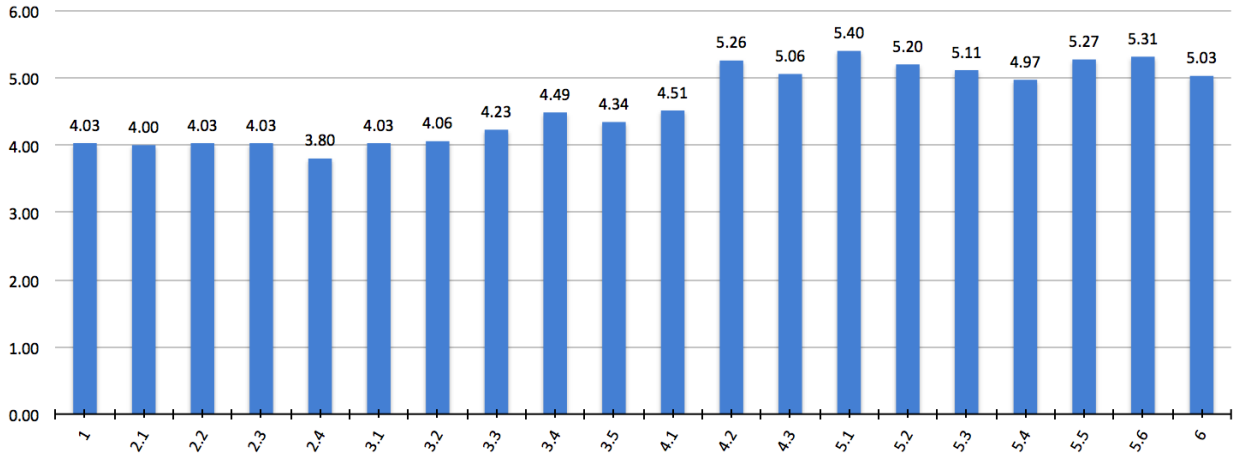

Figure 1. Survey results: this graphic shows the mean value for each question asked in the survey.

Relevant open comments (out of scope redacted) are listed below in full:

a) *Android class was really hard but all the other classes we're perfect*
b) *Thank you for everything ! That was a great and useful experience !!!*
c) *I like the Atmosphere with teachers and students. Especially our location (Student Village) was a good idea because this was the main point were we get to know each other.*
d) *I feel that the experience was unique and very positive. I really enjoyed meeting new people and sharing different perspectives.*
e) *I have enjoyed very much the experience because I have been able to improve my knowledge and have fun and meet new people.*
f) *It would have been great start the projects with our teams the first day to have more time to work.*
g) *Projects should have been started earlier, with less theoretical courses.*
h) *Project should have been started earlier.... but it was great!*
i) *Good: Atmosphere Worse: actor interaction, if possible real patients would have been more interesting*[1]
j) *The first week we did a lot of theoretical lessons and they were a little bit boring*
k) *I'm going to give some examples: The IT students had 2 days of Android Studio but ended developing the prototype in Marvelapp due to the lack of knowledge and the difficult to implement what we thought, so I think it would be better to see different types of apps like we saw in the lecture of (name redacted) or other examples of smartphone apps. Moreover, lectures that weren't practical were a little tiring, a lot of theory and little amount of examples. In the project I think we should have a little more of help from the teachers.*
l) *First week's classes felt a bit underdeveloped, as if they were thought to be made not for a summer school, but for a more extended period of time. Some of them were interesting as stand-alone lectures and were useful for the second week, but the majority didn't have any impact on our way to proceed with the project. Moreover, the project could have been a bit more guided. Those are my only complaints, and overall, the summer school was a great experience that I would live again without hesitating.*

4 DISCUSSION

Table 2 shows that all the items in the questionnaire were scored above the 'neutral value' of 3.5. The item with the lowest valuation was "Teaching content: will be useful in my future professional development " (Q2.4, $\mu = 3.8$), while the highest score was for the item corresponding to the teamwork satisfaction (Q5.1, $\mu = 5.4$). Whilst the lowest mark may be slightly disappointing, it is still above the neutral value. Clearly however, it suggests that eHealth is still an emerging subject, given that students were not entirely convinced by its usefulness for their professional development.

In general, it is observed that the maximum scores correspond to those items related to teamwork and the development of the project (category 5), with mean values ranging from 4.97 to 5.40. This is especially satisfying, as these were the questions that specifically considered the multidisciplinary aspect of the project groups, which were purposely selected by the teachers to ensure a good discipline mix. Features such as teamwork satisfaction (Q5.1, $\mu = 5.40$), personal involvement in the team (Q5.6, $\mu = 5.31$) or the team participation (Q5.5, $\mu = 5.27$) were highly rated. Thus, these scores demonstrate that students perceived multidisciplinary teamwork as a benefit of their formation. This is consistent with the hypothesis that hybrid backgrounds are optimal for the formation of eHealth professionals.

These results also correspond to the impressions collected in the qualitative part ($n = 12$) where students identified as satisfactory the work environment created both with teachers and colleagues, and emphasize that the Summer School has meant for them a unique and profitable experience for their future. They also believe that knowing people from other countries and sharing experiences and points of view is one of the strengths of the experience, e.g. response d) *"I feel that the experience was unique and very positive. I really enjoyed meeting new people and sharing different perspectives.*". Finally, one of the weak points identified corresponds to the theoretical sessions, which some people would have preferred to be shorter or more practical.

[1] Actors were employed to role-play service users. It was considered impractical and unethical to use actual service users for this experience.

The lowest scores (μ = 3.80 to 4.49) were identified on those questions regarding theoretical sessions. Results showed that the students found a lack of practical contents in these sessions, i.e. specific aspects that could be transferred to the practical part (app projects) of the Summer School. Perhaps a more problem-based learning approach from the outset might be a more appropriate model for hybrid students? This is something that can inform our next Summer School, taking place in Barcelona in 2019.

Regarding the VLE used (Moodle) and the display of contents and activities, results showed that students were in general satisfied, considering that the VLE was easy to use (Q4.1, μ = 4.51) and the materials were displayed on time (Q4.2, μ = 5.26). The general utility of the VLE was lesser valued (Q4.3, μ = 5.06) but still obtained a good result.

5 CONCLUSIONS

There have been a number of studies investigating the need, requirements and delivery of eHealth education. Those reported in the literature tend to focus on the arguments for healthcare students and professionals to become more technologically-aware and competent, in order for them to be able to use such technologies in their practice [13,14]. We believe this is the first study to evaluate a course experience specifically designed for students of both healthcare and technology, with a view to creating hybrid eHealth professionals of the future.

The results are very positive, and demonstrate that this model of course delivery is both feasible and of genuine utility. We have learned however, that theoretical delivery is not popular (it is often not so), and that this could have been exacerbated by the fact that students from mixed disciplines may struggle with such complexities that are outside their areas of specialism. This is something we need to research further, and perhaps to test alternative models of delivery in the future.

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REFERENCES

[1] V. Della Mea, "What is e-Health (2): The death of telemedicine?" *Journal of Medical Internet Research*, Vol. 3 no. 7: e22. 2001.

[2] J. Mitchell, “Increasing the cost-effectiveness of telemedicine by embracing e-health,” *J Telemed Telecare*, vol. 6 Suppl 1, pp. 16-19, 2000.

[3] S. Somaiya, “Healthcare's Slow Pace of Tech Adoption,” *Chicago Business*, 2018, Retrieved from http://www.chibus.com/perspectives/2018/5/1/healthcares-slow-pace-of-tech-adoption.

[4] European Commission, “Population ageing in Europe. Facts, implications and policies,” *European Commission*, 2014. Retrieved from https://ec.europa.eu/research/social-sciences/pdf/policy_reviews/kina26426enc.pdf

[5] V. Corsini, A. Gereöffy, G. Lanzieri, G. Senchea Badea, D. Thorogood, F. Zampogna (eds), “An ageing society - focus on the elderly,” in *People in the EU: Who are we and how do we live?* Eurostat, pp. 133-156, 2015.

[6] V. Corsini, A. Gereöffy, G. Lanzieri, G. Senchea Badea, D. Thorogood, F. Zampogna (eds), “Demographic challenges- population projections,” in *People in the EU: Who are we and how do we live?* Eurostat, pp. 157-173, 2015.

[7] WHO, “Good Health adds life to years. Global brief for World Health Day 2012,” Retrieved from http://www.who.int/world_health_day/2012

[8] NHS (England), “NHS Long Term Plan,” Retrieved from https://www.longtermplan.nhs.uk

[9] J. Vermeulen, R. Verwey, LMJ. Hochstenbach, S. van der Weegen, YP. Man, LP. de Witte, “Experiences of multidisciplinary development team members during user-centered design of telecare products and services: a qualitative study,” *J Med Internet Res*, Vol.16(5):e124, 2014.

[10] The Guardian, “How apps can help patients take care of themselves,” November 16 2016, Retrieved from https://www.theguardian.com/healthcare-network/2016/nov/09/apps-patients-take-care-themselves-digital-tech

[11] WHO,” Improving access to assistive technology,” Retrieved from http://apps.who.int/gb/ebwha/pdf_files/EB142/B142_21-en.pdf

[12] R. Likert, “A Technique for the Measurement of Attitudes,” *Archives of Psychology*, vol.140, pp 1–55, 1932.

[13] A. Dattakumar, K. Gray, A. Maede, K. Butler-Henderson, “Ehealth Education for Future Clinical Health Professionals: An Integrated Analysis of Australian Expectations and Challenge,” *Studies in Health Technology and Informatics*, vol. 192, pp. 954-954, 2013.

[14] A. Bygholm, J. Günther, P. Bertelsen, C. Nøhr, “eHealth education of professionals in the Baltic Sea Area,” *Studies in Health Technology and Informatics*, vol.180, pp 934-938, 2012.