The Longitudinal Study Of Medical And Health Care Students' Experiences And Attitudes Towards Interprofessional Learning In First Semester Course

Tiina Tervaskanto-Maentausta, MNSc, MEd
Oulu University of Applied Sciences, Finland
University of Oulu, Finland
Tanja Nordstrom, PhD
Essi Varkki, PhD, MD
Anja Taanila, PhD, Prof. Emer.
University of Oulu, Finland

doi: 10.19044/esj.2016.v12n15p23 URL:http://dx.doi.org/10.19044/esj.2016.v12n15p23

Abstract

Interprofessional course *"Public health and interprofessional collaboration"* was planned for the first semester medical and health care students by two universities of Oulu, Finland. The course architecture was built on blended methods including lectures, video based workshops, interactive e-learning phase based on family cases with everyday health and wellbeing problems of the family members. The course ended with student conference. All together 1681 students from ten different degree programs participated in the course during the years 2007-2013. In this paper we describe the students' readiness and attitudes towards interprofessional learning (IPL) with RIPLS (Readiness towards interprofessional learning scale) in the beginning of the course and students' feedback and learning experiences at the end of the course using the web based inquiry. The attitudes and readiness towards IPL were evaluated quite positive. The highest RIPLS scores were evaluated in Teamwork and collaboration. The different development of the attitudes between the groups was seen in Roles and responsibilities. In the longitudinal perspective the medical students evaluated all of the subscales lower than the health care students. The scoring stayed in the same level during the years. The difference between the groups was significant. The learning outcomes correlated linearly with students' own activity. Those students, who took actively part in web and group discussions learned most. Family cases helped them to get the big picture of the service system. Based on students feedback participative methods gradually replaced the traditionally methods like lectures during the years. The learning outcomes were evaluated relatively good.

Keywords: Interprofessional learning, attitudes, blended learning methods, public health, family centred care

Introduction

Health professionals' education has traditionally been conducted in silos that focus on discipline specific contents (Lennon-Dearing, Lowry, Ross, & Dyer, 2009). In order to prepare collaborative practice ready workforce and to improve better health care services and outcomes it is important to learn interprofessional (IP) team work skills during the undergraduate studies (WHO, 2010; Bridges, Davidson, Soule Odegard, Maki & Tomkowiak, 2011). In interprofessional education (IPE), students from various professions learn together as a team. It is a process by which a group of students from two or more health-related occupations with different educational backgrounds learn together during certain periods of their education with interaction as an important goal (Barr, Koppel, Reeves, Hammick & Freeth, 2005; WHO, 2010; WHO, 2013).

There is evidence that IPE can help to break down stereotypical views that professionals hold about one another, and can result in an increased understanding of the roles, responsibilities, strengths and limitations of other professions (Parsell & Bligh, 1999; Barr et al., 2005). Health care delivered by nurses, physicians, and other health professionals working in teams not only improves quality, but also leads to better patient outcomes, greater patient satisfaction, improved efficiency, and increased job satisfaction on the part of health professionals (Educating Nurses and Physicians: Toward New Horizons, 2010).

A number of principles are shown to be important in the design of IPE curricula. Oandasan and Reeves (2005) focused, for example, on the relevance contents of the learners' current and future practice. Use of typical, priority health problems requires IP approaches for their solution. Interprofessional learning (IPL) methods facilitate interaction between learners from different professions, including small-group learning formats such as case-based and problem-based learning. Curran and Sharpe (2007) underlined the need of such curriculum models and learning strategies in pre-clinical stage. Using cases, e-learning and face to face discussions as learning methods gives to the students' mutual learning opportunities of health promotion and prevention.

The use of blended learning methods and -environments activate the students to learn together (Carbonara et.al 2008). The use of real life cases will help the students to solve problems together and perceive a realistic client centered picture how the health care system works (Salomon, Baptiste, Hall, Luke, Orchard, Rukholm, Carter, Kiong & Damiani-Taraba, 2015; de

Jong, Savin-Baden, Cunningham & Verstegen, 2014; Lindqvist, Duncan, Shepstone, Watts & Pearce, 2005). The careful preparation of instructors for their roles in developing, delivering and evaluating IPE is very important, when planning a new curriculum (WHO, 2013; Curran & Sharpe, 2007).

IPE studies in early level of the curriculum help to develop students' own identity to interact with other health and social professionals (Wilhelmsson, Pelling, Ludvigsson, Hammar & Dahlgren, 2009). Early IPL experiences can help students to establish effective, collaborative and appreciative relationship with health professionals (Ateah, Snow, Wener, MacDonald, Metge, Davis, Fricke, Ludvig & Anderson, 2011; Ruebling, Pole, Breitbach, Frager, Kettenbach, Westhus, Kienstra & Carlson, 2013). Early entrance of IPL familiarizes learners with IP values (Anderson & Thorpe, 2008; Coster, Norman, Murrells, Kitchen, Meerabeau, Sooboodoo & d'Avray, 2008).

Based on the curricula analyses of both universities of Oulu, University of Oulu, Faculty of Medicine (OUM) and Oulu University of Applied Sciences (OUAS), a common course "Public health and interprofessional collaboration" was planned for the first semester health care students. The contents of the course was aimed so that students familiarise themselves with premises of health promotion and possibilities of interprofessional collaboration (IPC), challenges of public health, functioning of national health and social welfare systems as well as national public health strategies.

The specific goals of the IP course were that the students learn to respect and support each other, and learn to work as an IP team in preclinical level. Furthermore, we focused on the learning of patient and family centered care. In this paper we describe the progress of the course implementation and investigate the students' readiness and attitudes towards IPL in the beginning of the course, their feedback of the course structure and their learning experiences at the end of the course.

Design of the course

An IP group of lecturers from both of the universities was established to make the pedagogical framework of the course. The course architecture was built on blended methods (Sung, Kwon & Ryu, 2008; de Jong et al, 2014) and it consisted of three parts. The students learned and worked together in IP groups in various environments processing the idea of IPL, patient centred care, and the trust of each other (McMurtry, 2010). The Figure 1 describes the contents and progress of the course.

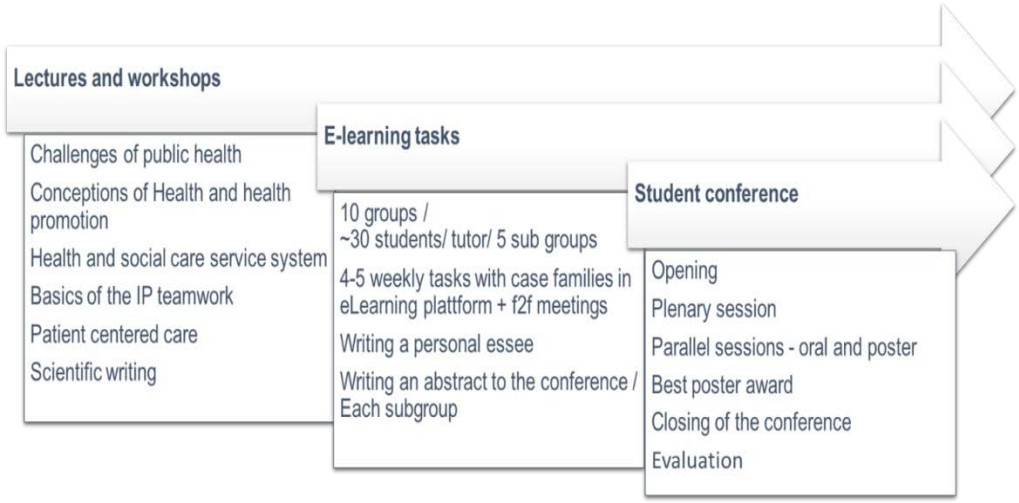

Figure 1. Course architecture

First part of the course included keynote lectures for all. Second part was an interactive eLearning phase based on five fictitious family cases with different kind of everyday health and wellbeing problems. Weekly discussion tasks focused on children under school age, pupils and students, working age and elderly persons of the family (Figure 1.).

During the e-learning period the students were divided into ten groups. The task was to discuss together and find out solutions to what kind of primary services the families can get and how the IPC of the service providers and professionals (public, private, third sector) helped to solve the everyday problems of the family and family members. Each group (~30-35 students) had a tutor teacher. Below is one example of the family cases.

Family case Virtanen:

The family Virtanen lives in a Finnish suburb. The mother of the family had passed away due to breast cancer three years earlier. **Father Raimo** (47 years) is an IT engineer and works in a local IT-company. He has health problems including depression and his use of alcohol has increased. He visits occupational health service when needed. **Son Miika** (16 years) is in upper secondary school. He likes to sit and play with computer. He is overweight and bullied at school. The school nurse and the teacher have been in contact with the father about these issues. **Daughter Tiia** (11 years) has diabetes type 1. She takes good care of her medication and tests and the blood sugar levels are in balance. She has a lot of friends. Tiia visits diabetes nurse in primary care regularly and has yearly visits in pediatric policlinic at the university hospital. The oldest daughter is **Anniina** (18 years). She lives together with her **boyfriend Petteri** (20 years) and their **child Kiira** (2

years) in a flat in the town close by. Both parents are unemployed without any vocational education and have social problems. They visit primary care and child health clinic, from where they have got for example extra help for home. Kiira attends kindergarten three days a week. The father Raimo has a brother (**Jouni** 56 years), who is single. After he had a myocardial infarction a couple of years ago, he retired and he is now taking care of his **elderly parents** who suffer from dementia. They live in Lapland in an old rural house.

Thirdly the students prepared themselves to the student conference first by searching information concerning the health and social strengths and problems of the family, and then writing an individual essay. Students were divided in small groups based to similar contents of the essays and finally the group wrote together a common abstract to the student conference. The student conference was the final part of the course. It was organized like a scientific conference including opening, plenary session, parallel sessions with oral and posters presentations, best poster award and closing of the conference.

A written info material of the tasks, duties of the students and tutors, deadlines, compensatory tasks, forms of essays and abstracts and practical advice of the student conference were prepared. Prior to the course pedagogical training of IPE and participative methods were organized to the tutors (Curran & Sharpe, 2007). The tutors had regularly meetings together during the course. After the first pilot course in Autumn 2007, according to the students' feedback, improvements were made to the implementation and methods of the course.

Participants of the study

All together 1681 first semester university students from ten different degree programs of health care education participated in the course during the years 2007-2013. The number of students of medicine was 600 and the dentist students 360. In this study they formed the group of Medical students N=960. The group Health care students (Health N=721) consisted of the dental hygienists- (N=135), midwifery- (N=150), nurse- (N=174), paramedic- (N=45) and public health nurse- (N=130) students. The occupational therapist students (N=25) joined the course from the year 2011. In the year 2013 the students in this group included also radiography- (N=34) and biomedical laboratory science- (N=28) students. The yearly number of the participants increased from 220 to 350.

Methods

In the beginning of the courses (2008-2011) attitudes and readiness for interprofessional learning were evaluated using Readiness for

Interprofessional Learning Scale (RIPLS, Parsell & Bligh, 1999) (N=1103, 89.3%; Med n= 667, Health n=436).

At the end of the courses feedback of the course structure and learning experiences of the students (N=1464 (83.6%; Med n=909, Health n=555) were evaluated using the web based inquiry. The students (N=220) from four different degree programs (medicine, dentistry, nursing, dental hygiene) were the pilot group in Autumn 2007. The group of degree programs added to ten during the years 2008-2013.

The feedback questionnaire consisted of 38 statements under five categories lectures and workshops, e-learning platform, discussion and collaboration in the group, evaluation of my learning and student conference. The evaluation based on Likert scale (1 totally disagree-5 totally agree).

The quantitative data was analyzed using IBM SPSS Statistics, version 21 (1989, 2012 SPSS, Inc., an IBM company). The attitudes and readiness of the students for IPL were investigated using the three subscales of RIPLS (Teamwork and collaboration, Professional identity, Roles and responsibilities) presented by Parsell & Bligh (1999). The feedback data was analyzed using SPSS in five subscales: Lectures and workshops, e-learning platform, Discussion and collaboration in the group, Evaluation of my learning, and Student conference. The differences between the groups (Medical students and Health care students) were investigated by Analysis of Variance (ANOVA).

Results

Students' readiness towards IPE

In the beginning of the studies students' readiness and attitudes towards IPE were positive and improved year by year and stayed very positive. The most remarkable positive change was in the year 2010 (Figure 2). Teamwork and collaboration were highly valued in groups of Medical students and Health care students. Similar development was seen in the subscale of Professional identity with both of the groups. A tendency for these latter two subscales among health care students was lightly stronger compared to medical students. Statistically significant differences between the groups were seen in the subscale of Roles and responsibilities ($p = 0.000$). Interestingly, medical students evaluated it quite similar and lower level then the health care students during the years (Figure 2).

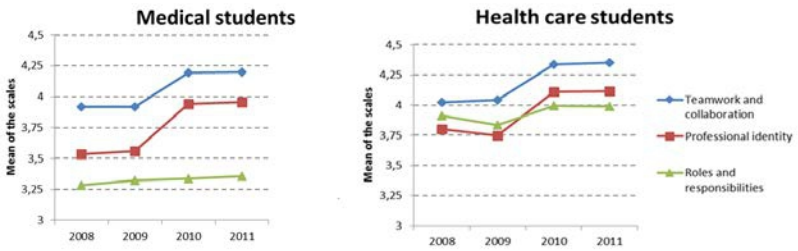

Figure 2. Longitudinal development of readiness and attitudes for IPL

Next, the readiness and attitudes of the students were investigated in more detail. Results were compared between the groups in 2008 and 2010, when the biggest change to more positive direction was seen. Comparisons were made between statements, where the variation was most notable big (Table 2). In the subscale Teamwork and collaboration all students valuated highly the patient centered care and solving patients' problems together (agreed Med 91.4-93.3%, Health 93-95.9%). Communication skills were evaluated important too (agreed Med 59.8-78.2%, Health 66.6-76.8%). Evaluation in trusting and respecting each other was agreed 91.7-93.9% of medical students and 97-98.7% of health care students. The variations in opinions between the groups were not high, but the health care group evaluated these statements little higher (Table 1).

The trend in evaluation in subscale Professional identity appeared similar. In the opinions of the statement "Shared learning will help me to clarify the nature of patient' problems" was a clear difference between the groups. In 2008 34.7% of the medical students and 60.8% of the health care students agreed or totally agreed with it. In 2010 the results were M 54% and H 68% (Table 1).

The differences between the groups were most prominent in the subscale Roles and responsibilities. In 2008 43.4% and in 2010 57.6% of the medical students disagreed the function of nurses and therapist as assistants of the doctors. Health care students' opinion changed from 65% to 69.4%. The statement "I'm not sure, what my professional role will be" was disagreed 70.5-70.7% of the medical- and 78.5-80.4% of the health care students (Table 1).

Table 1. Medical and health care students' attitudes towards IPE comparing groups 2008 and 2010 (RIPLS) (Disagree 1-2, Partly agree 3, Agree 4-5)

Statements from subscales	Likert	Med %		Health %	
		2008	2010	2008	2010
Teamwork and collaboration:					
Patients would ultimately benefit if health care students worked together to solve patients´ problems	Agree	91.4	93.3	93.0	95.9
	Partly agree	7.4	3.6	5.1	2.8
	Disagree	1.2	3.0	2.0	1.4
Communication skills should be learned with other health care students	Agree	59.8	78.2	66.6	76.8
	Partly agree	30.2	15.2	27.3	19.4
	Disagree	9.8	6.1	6.1	4.2
For small group learning to work, students need to trust and respect each other	Agree	91.9	93.9	97.0	98.7
	Partly agree	6.2	3.6	3.1	1.3
	Disagree	1.8	2.4	-	-
Professional identity:					
Shared learning will help me to clarify the nature of patient' problems	Agree	34.7	54.0	60.8	68.0
	Partly agree	47.8	39.0	29.9	29.2
	Disagree	17.4	6.1	9.2	2.8
Roles and responsibilities:					
The function of nurses and therapists is mainly to provide support for doctors	Agree	22.3	15.4	15.4	12.5
	Partly agree	34.2	27.0	19.6	18.1
	Disagree	43.4	57.6	65.0	69.4
I'm not sure what my professional role will be	Agree	7.4	9.7	4.1	5.3
	Partly agree	17.3	19.5	17.3	14.7
	Disagree	70.5	70.7	78.5	80.4

Students' feedback and evaluation of their learning

The students' feedback of the course structure and learning experience were investigated using the sum squares of main categories of the questionnaire: Lectures and workshops, e-learning platform, discussion and collaboration in the group, evaluation of my learning, student conference (Figure 3). The course structure was modified yearly according to the students' feedback. Students' opinions seemed to divide in three opinion groups. One part of the students evaluated their learning and the methods negative in each variable and the other part very positive. The biggest group was moderately satisfied to the course, its methods and their learning (Figure 3).

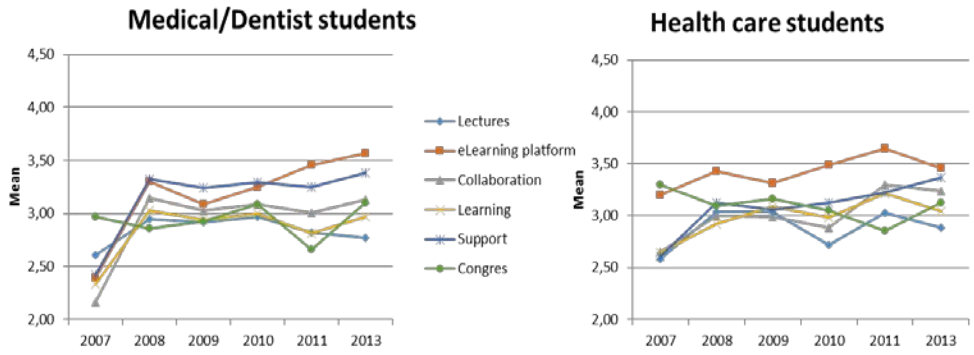

Figure 3. Feedback and learning experiences between the students' groups

The traditional part of the course were lectures. Participation during the first day of the course and keynote lectures was obligatory. The other sessions were organized as team teaching with lecturers from both universities and/or using special experts. The problem was that students participated in the lectures in low numbers. Feedback from the students was that the lectures were too medically centered. The number of the lectures as thus diminished and interactive workshops with video clips were kept instead (Figure 1). A web test of essential contents of the lectures and workshop was taken in use. Two thirds of the evaluated students felt that they learnt moderately well during the lectures and workshops.

The most critical group of the students didn't like the e-learning method at all and the most satisfied students felt that e-learning and online discussions were the best part of the course. The first important modification was to keep face to face meetings once a week during the e-learning part (Figure 1.). The uniformed guidelines to the tutors were made for these meetings. The students familiarized themselves with each other and got to know both campuses as well. This led to more active online discussions and mutual collaboration. The second alteration was to split the discussion groups in smaller 5-7 students' subgroups. Each subgroup had their own case family. Most of the students' opinion was that the cases helped them to learn how the health and social system works and the importance of IP teamwork. The value of e-learning increased in both of the groups, but especially among the medical students during the years.

The tasks of writing the essay and abstract focused to preparing the students to the student conference. Students evaluated that it was quite difficult to perform both tasks and also tutors found it very time consuming to evaluate and give feedback about both tasks. The task of personal essay was thus discontinued and only the small group abstract task was left. The students evaluated the support they've got during the course from instructors

good. Year by year the methods of the conference presentations got more creative forms.

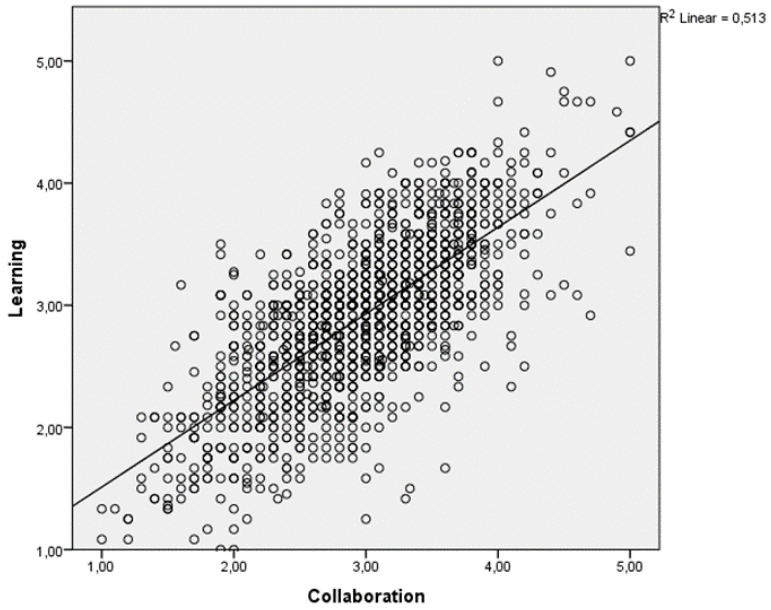

Figure 4. Correlation of students' collaboration to learning experience

The learning outcomes correlated linearly (0,513) with students' own activity and collaboration with others on e-learning platform (Figure 4). Those students, who took an active part in web and group discussion, search and shared knowledge, learned most.

Discussion

The attitudes and readiness towards IPL in the beginning of the course were evaluated quite positive in all of the RIPLS subscales. The highest scores were evaluated in Teamwork and collaboration alike in Williams, McCook, Brown, Palmero, McKenna, Boyle, Scholes, French & McCall (2012) study. The statements "Patients would ultimately benefit if health care students worked together to solve patients problems" and "Shared learning will help me to clarify the nature of patient' problems" were scored high and a remarkable increase was seen in the attitudes of both of the groups in longitudinal inspection.

In the longitudinal perspective the attitudes developed more positive in both of the groups, even though the students participating in the courses were different every year. The overall tendency of attitudes and readiness of medical students was little bit lower than health care students. Previously, Curran, Sharpe. & Forrinstall (2007) investigated the attitudes of health science faculty members towards IPE and found that medical faculty

members reported lower scores than other disciplines. In this study, this might explain the difference, but unfortunately we did not research the faculty members.

The different development of the attitudes between the groups was seen in Roles and responsibilities. In the longitudinal perspective medical students' evaluation of their roles and responsibilities stayed constant at the same level. Health care students' attitudes were developed more positive like with the other RIPLS scales. The difference between the groups was significant. The medical students' evaluation of their roles and responsibilities made an exception, which stayed constant at the same level during the researched years.

The IP course contents included public health, health promotion, health and social service system, public health strategies and patient / client/ family centred care. These themes are typically used in IP curriculum in pre-clinical level (Curran & Sharpe, 2007; Oandasan & Reeves, 2005). The use of family cases helped the students to familiarize to public health state of the Finns, to public health programs and strategies and patient centred orientation as well as the meaning of shared responsibilities to improve public health. Darlow, Coleman, McKinlay, Donovan, Beckingsale, Gray, Neser, Perry, Stanley & Pullon (2015) resulted in short IP course improved attitudes of IP team working and collaboration towards patient centred care.

A part of the students were in opinion that the course contents were too difficult to learn in the beginning of the studies. They felt that learning of IP skills should be organized in real life context. The other part of the students were in opposite opinion and saw the course content and collaborative learning important. Coster et al (2008) found out that it's important to introduce IPL in the beginning of the studies. Nevertheless IP teams must have at least a basic level of understanding of each other's disciplines and the roles within the health care system (Ateah et al, 2011; Curran & Sharpe, 2007).

Based to students feedback participative methods gradually replaced the traditionally methods like lectures. To activate participation to the common lectures and after students' suggestion a web test based on information of the lectures and workshops was taking in use. The feedback was divided between positive and negative opinions. The online group discussions about health challenges of the different age family members helped the students to learn about public health issues and importance of sharing responsibilities with professionals and clients. The use of blended learning methods and -environments and real life cases activated collaborative learning and seeing the big picture of the service system (Carbonara et.al, 2008; Salomon et. al, 2015; Lindquist et al, 2005).

Students' opinions of working in e-platform varied a lot. The minority of the first semester students were not familiar with ICT supported learning. According to their wishes face to face meetings were integrated once a week in the e-learning period. Those group meetings were evaluated important in order to learn to know each other and about each other's professions. Carbonara et al (2008) found out, that blended instructional formats, e-learning and combining face-to face, provide pedagogical evidence to IPL.

Online learning was effective, when students took an active part in discussing on e-platform. The learning outcomes correlated linearly to students' active communication and collaboration. Family cases helped them to face the real life situations and the importance of IPC. Salomon et.al. (2010) had similar findings of using real life scenarios and IP problem solving in an IP online course. The role of facilitators was important to make the discussions more explicit and open minded to IP thinking. De Jong et al (2014) pointed also the importance of clear rules and technical support in e-learning.

The courses ended with the student conferences. The students evaluated the conferences in average quite good. The students got familiar to the scientific writing and working. During the years new ideas to the conference presentations were found like critical videos, socio dramas, interviews of clients etc. Student conferences have been successfully organized in Queen's University Canada (2016) with a focus on improving connections within health care and to demonstrate client centred, collaborative teamwork.

Conclusion

Two universities have the development of IPE curriculum with small steps. IPE was planned to start in the beginning of studies and integrate IP courses and training to the curricula during the studies. There were many barriers to be broken. To put the plans in reality was the first of those. Two different educational curriculum had to put together and motivate all the students of the several degree programmes to work and learn together. The stereotypical attitudes of the teachers were to be won. From a suspicious beginning the attitudes of the administrative and teaching staff as well as students changed to more positive. Although the campuses are closely located to each other, it was not until this course that students started to socialize together.

Part of the students evaluated the course contents difficult for the starters. Furthermore the group discussions and workshop with the family cases got the students familiar to societal debate of public health issues and family centered thinking as well as the importance of the interprofessional

teamwork and collaboration to deliver the services. In the rapidly changing world it's important for today and future health professionals to be aware about the health and social policies and strategies.

A large number of the students and tutors made the coordination and implementation of the course challenging. Even though the tutors were trained and common plans were made, still the students still felt they were not in an equal position of passing the tasks and having as interesting methods in the group meetings than the others. The challenge was that the tutors were changed often. Only the core group of the tutors stayed the same during the years. Due to different opinions it was hard to make the course architecture as good as possible to the learners because the participants and partly the tutors were different each year.

One challenge was that the students were not familiar to use of modern participative learning methods, basically in the first years of the study. The written guidelines of the tasks and learning in the course were yearly improved. Still the problem was that some of the students did not read them. In longitudinal perspective students familiarized themselves with the modern active learning. The attitudes towards IPL became more positive. Learning outcomes stayed on the same relatively good level during the study despite of the yearly improvements based on students' feedback

References:

Anderson, E. S. & Thorpe, L. N. (2008). Early interprofessional interactions: Does student age matter? *Journal of Interprofessional Care*; Volume 22, Issue 3.

Ateah, C.A.,Snow, W., Wener, P., MacDonald, L., Metge, C., Davis, P., Fricke, M., Ludvig, S. & Anderson, J. (2011). Stereotyping as a barrier to collaboration: Does interprofessional education make a difference? *Nurse Education Today*; 31, 208-213.

Barr, H., Koppel, I., Reeves, S., Hammick, M. & Freeth, D. (2005). *Effective interprofessional education – Argument, assumption and evidence*. CAIPE London, United Kingdom: Blackwell Publishing.

Bridges, D. R., Davidson, R. A., Soule Odegard, P., Maki, I.V.& Tomkowiak, J. (2011). Interprofessional collaboration: three best practice models of interprofessional education. *Medical Education Online*; 16: 10.3402/meo.v16i0.6035

Coster, S., Norman, I., Murrells, T., Kitchen, S., Meerabeau, E., Sooboodoo, E. & d'Avray, L. (2008). Interprofessional attitudes amongst undergraduate students in the health professions: A longitudinal questionnaire survey. *International Journal of Nursing Studies*; 45 (2008) 1667–1681.

Carbonaro, M., King, S., Taylor, E., Satzinger, F., Snart, F. & Drummond, J. (2008). Intergation of e-learning technologies in an interprofessional health science course. *Medical Teacher*; 30:25-33.

Curran, V.R. & Sharpe, D. A. (2007). Framework for Integrating Interprofessional Education Curriculum in the Health Sciences. *Education for Health*; Volume 20, 3.

Available from: http://www.educationforhealth.net/Dahlgren L.U. 2010. Interprofessional learning as a means of enhancing professional competence. Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen. Volume 104, 1, 5–9.

Curran,VR., Sharpe, D.A. & Forrinstall, J. (2007). Attitudes of health sciences faculty members towards interprofessional teamwork and education. *Medical Education*; 41.892-896.

Darlow, B., Coleman, K., McKinlay, E., Donovan, S., Beckingsale, L., Gray, B., Neser, H., Perry, M., Stanley, J. & Pullon, S. (2015). The positive impact of interprofessional education: a controlled trial to evaluate a programme for health professional students. *Medical Education* 15:98. Doi 10.1186/s12909-015-0385-3.

de Jong, N., Savin-Baden, M., Cunningham, A. M. & Verstegen, D. (2014). Blended learning in health education: three case studies. Perspectives on *Medical Education*; Sep; 3(4): 278-288.

Educating Nurses and Physicians: Toward New Horizons (2010). Advancing Inter-professional Education in Academic Health Centers. *Conference summary*; Josiah Macy Jr. Foundation and the Carnegie Foundation for the Advancement of Teaching.

Lennon-Dearing, R., Lowry, L.W., Ross, C.W., & Dyer, A.R. (2009). An interprofessional course in bioethics: Training for real life dilemmas. *Journal of Interprofessional Care*; 23(6): 574-585.

Lindqvist, S., Duncan, A., Shepstone, L., Watts, F. & Pearce, S. (2005). Case-based learning in cross-professional groups – the development of a pre-registration interprofessional learning programme. *Journal of Interprofessional Care*; 19(5): 509-520.

McMurtry, A. (2010). Complexity, collective learning and the education of interprofessional health teams: Insights from a university-level course. *Journal of Interprofessional Care*; 24(3):220-9.

Oandasan, I. & Reeves, S., (2005). Key elements for interprofessional education. Part 1: The learner, he educator and the learning context. *Journal of Interprofessional Care*;Volume 19, Supplement 1, 005.

Parsell, G. & Bligh, J. (1999). The development of a questionnaire to assess the readiness of health care students for interprofessional learning (RIPLS). *Medical Education*; 33, 95-100.

Ruebling, I., Pole, D., Breitbach, A. P., Frager, A., Kettenbach, G., Westhus, N., Kienstra, K. & Carlson, J. (2014). A comparison of student attitudes and perceptions before and after an introductory interprofessional education experience. *Journal of Interprofessional Care*. Volume 28, Issue 1, 23-27

Salomon P, Baptiste S, Hall P, Luke R, Orchard C, Rukholm E, Carter L, Kiong, S. & Damiani-Taraba, G. (2010). Students' perceptions of interprofessional learning trough facilitated online learning. *Medical Teacher*; 32: e361-e398.

Sung, Y.H., Kwon, I.G. & Ryu, E. (2008). Blended learning on medication administration for new nurses: integration of e-learning and face-to-face instruction in the classroom. *Nurse Education Today*; Nov 28(8):943-52.

WHO (2010). Framework for Action on interprofesisonal Education & Collaborative Practice. *World Health organization*.

WHO, (2013). Transforming and scaling up health professionals' education and training: *World Health Organization guidelines*.

Wilhelmsson, M., Hammar, M., Dahlgren, L-O. & Faresjö, T. (2009). Twenty years experiences of interprofessional education in Linköping – ground–breaking and sustainable. *Journal of Interprofessional Care*;Volume 23, Issue 2. 2009.

Williams, B., McCook, F., Brown, T., Palmero, C., McKenna, L., Boyle, M., Scholes, R., French, J. & McCal,l L. (2012). Are Undergraduate Health Care Students Ready for Interprofessional Learning? A Cross-Sectional Attitudinal Study. *The Internet Journal of Alied Health Sciences and Practice* 2012. Vol. 10 No.3.

Queens University. National health sciences student conference. 2016 http://www.queensu.ca/gazette/stories/national-health-sciences-student-conference-being-hosted-queens