

Inverted Classroom as Innovative International Educational Technology in Teaching Doctors in Global Challenges Era

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Abstract— The research is based on the accomplishment experience of The international Swiss-Russian TICOM project – Transcultural Inverted Classrooms in Osteopathy and Medicine, focused on testing modern technologies for inverted classes. The investigation is dedicated to the topical issue of upgrading doctors’ vocational skills and providing medical vocational training in international context, meeting European Union demands and standards for medical workers. Modern competence-based conception of the vocational education and training integrity leads to distinguishing between hard skills and soft skills of a doctor, having to solve both bodily treatment and interpersonal communication tasks. These two groups of tasks are tightly interconnected in many ways and modes, vehemently influencing the efficiency of medical help in intersubjective and “bio-psycho-social” paradigm. So ‘medical treatment of the whole patient’ has become a point of competitiveness in vocational sphere. The complexity of the task of providing modern patient with proper medical treatment leads logically to introducing of meta-competences level of professional preparedness as a tool of vocational education expertise and designing new approaches and solutions to teaching students medical profession. At the same time new educational content

demand new forms and methodology of teaching. The educational task of fostering holistic approach in doctor-to-patient communication was tried in Swiss-Russian Inverted Classroom educational and research project, challenging the preparedness of medical students for vocational activity to follow such values as “openness, professional integrity, and warmth”. The analysis of effectiveness of the approach, educational form (i.e. Flipped Classroom), educational tools and techniques used is discussed in the report.

Keywords: *human capital, global challenges, international careers and international medical education, expertise in education, flipped classroom, ICT, integrity of education and vocational competency of a doctor*

I. INTRODUCTION

Education is traditionally and justly viewed as an important part of human capital [1; 2.;3]. The importance of medical care quality both in personal and in social contexts cannot be argued. The problem of medical up-to-date education can be solved by application of modern teaching

technologies, especially combined with innovative target-setting, appropriate methodology, good will and international experience and expertise. The article reflects key results of international educational collaboration between School of Health Sciences Fribourg, University of Applied Sciences and Arts Western Switzerland HES-SO and Pavlov First Saint Petersburg Medical University, Russia (Project TICOM). Medical treatment at the age of high technologies is challenged by the threat of dehumanization. The design of the project was essentially based on the idea that effectiveness of medication at the age of high and powerful technologies depends vastly on the quality of interpersonal communication between the doctor and the patient [4; 5; 6; 7.; 8.;9; 10; 5.; 11]. And it is getting really hard in case of doctor's communication with so-called 'difficult patients'[9]. This one issue is especially tightly connected to practical development of the humanistic conception of 'treating the whole patient' as a key medical care principle of the future [12; 9.].

The core objectives of the project TICOM were the elaboration, creation and testing of a specially designed educative package that is aimed at forming the common frame of vocational training of universal doctors' and medical staff *patient-centred communicative skills* and *meta-competencies* that are in demand nowadays worldwide. The universalism of target "educative package", its accessibility in terms of modern communication technologies (and availability) for international learners, as well as attainability of stated targets are viewed as sources of its extended applicability throughout the world for various medical educational institutions, such as for example "The Red Cross" and the other medical help and healthcare organisations.

II. LITERATURE REVIEW

Contemporary society demands the doctor to have not only 'hard' competences – clinical thinking and skills, but also the ability to interact effectively with various actors of the clinical process – patients, their next of kin, fellow doctors, **medical staff and non-physical medical specialists (occupational therapists, clinical psychologists, etc.)** [13; 7.;8; 9; 10]. Moreover, due to the onrush of medical technology and robotization of a medical process (using neuro nets, etc.), it is a high level of communicative competence and the ability to be communicative and empathetic that can help human to retain competitive advantage against the machine. Forming of such competitive universal communicative competences is aspired as available through the use of modern educational *approaches* and *technologies*, such as *self-directed learning* and *inverted classes*.

Over several decades new methods and technologies aimed at forming an active and initiative employee have appeared. Nowadays it is widely assumed that forming such an employee can be achieved through the shift of the educational activity from a teacher to a student. In the middle of the XX century there appear such didactic trends as *self-directed learning* or *self-regulated learning*, implying conscientious and responsible position and attitude of the learner to developing one's necessary skills. Modern medical job market has produced demand not only for a diploma, but also for certificates of employee's competencies in particular spheres

of training and job performance. This tightly connected with employee's responsibility in choosing and taking an educational trajectory and unique personal educational path within the continuous vocational (medical) education system. So building a unique educational path conforms with self-directed and self-regulated learning. Designing a universal educational module like that one in TICOM project can be viewed as providing a competitive educational supply product for educational demand market.

The key peculiarities of the *self-directed learning*, well reflected in **theory [14;15; 16; 17;18; 19; 20; 21] in this case can be summed as follows:**

- it can happen in a variable educational environment. It can include various activities and sources – reading alone or networking, taking part in the research groups, internship, discussion, brainstorming, dialogue through some digital sources, reflexive dialogue, written works and so on.

The student takes responsibility for planning the decisions connected with the education and learns how to transfer knowledge and skills from one situation to another.

The teacher's role in self-directed learning model is to model the whole lesson system and to provide communication among the students, provide and coordinate the work with the teaching material, assessment of the results, and facilitating critical thinking. In case of healthcare teaching, it helps developing medical judgment.

The self-directed learning system models and regulates team-building and net-working processes and promotes competencies that are necessary for net-working in the multidisciplinary team.

- student's autonomy is formed and the necessary competencies for working with the scientific literature, the skills of searching, collecting, grouping, processing, analyzing the data, developing the medical judgment that are formed are highly required by healthcare specialists.

III. RESEARCH METHODS AND METHODOLOGY

A. *The inverted classroom technology*

The Inverted Classroom technology allows organizing preconditions for the self-directed learning within the formal education framework. The acquisition of syllabus and competencies is organized the way that each student works under his/her own tempo, using the methods and tools that are common to modern student.

Under this technology, various gadgets (computers, tablet computers, smart phones) and means of communication (in this case Skype, Slack, Google, etc.) can be used. On one hand, it allows the student to polish the skills of working using computer technologies that is needed in contemporary information society. On the other hand, it corresponds the ways of communication that are common for younger generation, thus raising their interest and learning motivation.

The Inverted Classroom is a process, oriented at organising the students' activity. It helps to integrate innovative educational technologies, methods and tools into a unified system and to implement it into an already existing educational program thus providing high results of education. Sometimes the inverted classroom is referred to so called blended learning when various sources (including the Internet, educative platforms), full-time and distant-learning technologies are used in the educational process. Multimodality of learning is a trait common for both blended learning and Inverted (also named flipped) classroom [23].

The education under this model is called "the inverted one" as it breaks the established sequence when the syllabus at first is provided by a teacher at the auditorium and then – at home while making the independent work. The inverted classroom technology is quite the opposite.

B. The procedure and the stages of pilot study

The Inverted Classroom included two 6 hour lessons; one focusing on active communication skills and the other on the shared decision making process.

The participants of the international Inverted Classroom were two groups of second-year students from medical universities from St. Petersburg and Fribourg (20 people on each side). The age and experience background of the students were matching. The pre-condition for Russian students was fluency in English, because all the materials for the preliminary study, test, case analysis and discussion were prepared in English.

C. The First Inverted Classroom «Patient-centered active communication skills»

The first inverted class "Patient-centered active communication skills" was dedicated to such patient-centered doctor-to-patient vocational communication topics as *active empathy, active listening, non-verbal communication, clinical conversation*. It lasted from 10:15 to 17:00. Communication between international groups of students was performed by Skype.

The preliminary stage of preparation to Inverted Classroom included students' study of theoretical material, clearing up the key terms; doing self-analysis, based on one's own personal experience in active communication, patient-centered communication, manifestation of empathy, etc; reading recommendations for coming group work. Students were split into minor groups.

The lesson included the following types of work:

- a) Involvement in the work (awareness of the concepts of "clinical conversation", "active listening", "non-verbal communication", "empathy" for each of the participants)
- b) Individual study of the theoretical material and the formulation of questions;
- c) Group work. Each group had its topic for discussion (the principles of clinical conversation, the main components of active communication, etc.). It was necessary to collect the information, to formulate answers to the questions in writing.

The answers were presented to the group as a short report and were loaded into the ActCom system (based on Google Disk);

d) *The shift from theory to practice*. The groups simulated a 45-minute clinical conversation with the patient;

e) SWOT-analysis of the lesson: analysis, and reflection, determination of the objectives of the subsequent work on this topic, the possibilities of using the knowledge in practice;

f) Receiving themes for further studying and literature for doing the subsequent homework.

Information provided to students was carefully selected by teachers, discussed and approved during joint working meetings. All the information provided to students corresponded to those didactic goals and objectives that were set within the framework of each lesson. Previously, a long and laborious work was carried out to develop the classes and to synchronize them in two countries, taking into account cross-cultural and regional peculiarities, restrictions and even the difference in time zones. Students were registered in all the electronic systems necessary for conducting online classes (Google, Slack, etc.). Materials were sent to each student by e-mail, including personal doctor empathy questionnaires.

The Swiss and Russian groups worked both individually, each with its own moderators (E.A. Vatskel, N.V. Krasilnikova; P. Vaucher, J. Liengme, A. Baraboshina), and jointly, via Skype. The episodes of international communication between the groups of students included greeting, presenting the results of their work, working on a case study within a "clinical vignette" [21; 14] (i.e. a clinical conversation with the patient), and following a joint discussion of the lesson SWOT analysis conducted by each side.

The Second Inverted Classroom "Shared decision making" The second inverted classroom highlighted issues of patient-centered communication and joint decision-making, determining the goals of the interaction between the doctor and the patient, the patient's self-management, the formation of constructive strategies for coping behavior in the conditions of the disease. The general lesson schedule was identical to the first one.

The central plot of the lesson was medical consulting a "difficult patient", performed by actor, in fact being oneself an experienced doctor. The patient is to be seen by four physicians – a neurologist, a neurosurgeon, a physical therapist and an osteopath. Their aim is to understand patient's situation, to identify and decide on what needs to be addressed or prioritized when treating patient's situation and pain and to help a patient in the decision-making. Using active communication skills, four volunteer students need to interview the patients to have the patient choose the most appropriate actions to solve the health problems. They are to facilitate patient's choices and address the problem in all its complexity. Other students can provide cues, tips and suggestions using Slack and the guidelines related to the topic

Students need to show signs of openness, professional integrity, and warmth. They have to find clues to the patient's thoughts and feelings and identify the state and situation of the patient correctly. As they move forward, they need to make

sense of the situation and build a clear picture of the problem. They need to be present, focused, and engaged in building an accurate picture of patient's state of mind and facilitate patient's choices for medical treatment.

If the students are able to build trust and confidence, the patient will reveal certain necessary information. The final goal of the interaction is that within the time frame, the interviewer can work out a clear strategy on priorities in medical treatment and what is to be done by the patient before the next appointment.

D. Moderation of Inverted Classroom

The international Inverted Classroom was based on complex and flexible system of control and moderation of purposeful learning process. Moderation of inverted classroom has been designed as a multi-layer system of leading, monitoring and regulating the learners' educational activity process. Students' vocational self-management skills were stimulated by expert opinion of fellow-students within a team (so called "Quartet"), by accessible supportive instructional materials, by teachers as moderators' opinion, by the actor oneself, playing the role of 'difficult patient', and by international experts board.

E. The international collaboration component

The international collaboration within working under the Inverted Classroom models can help to build a common educational space, to promote the exchange of experience, to provide new approaches to communication in vocational context. It helps to identify, define, interpret and critically assess ethic values and to enrich the collaborating countries with local approaches.

The conditions for international Inverted Classroom were partly overlapping with those, pertaining to Communicative Quest, implying "learning not only vocabulary and grammar, but also social skills, foreign communicative culture, sensitivity to style as well as sense of appropriateness of communicative move in certain communicative situation" [24, p. 121]. However, the substantial role belonged to finding personal approaches to reaching the key goals of *medical educational meta-competence* in conversation with a "difficult patient" within doctor's vocational culture framework, established in such terms as "*be present, focused and stay engaged with your patient*". This difficult kind of doctor-to-patient communication sometimes reaches the fifth (i.e. the highest) level of interpersonal communicative interaction goal-setting, labelled as "revalorization and change of pre-set values of the interlocutors" [cf. 25].

IV. RESULTS

The two Inverted Classrooms produced personal awareness effect on the students. They processed the educational information and changed their primary attitudes to the issue of doctor-to-patient communication. Task-based role-playing stipulated application of various vocational knowledges and skills, added a personal touch to new knowledges, triggered medical students' interest for designing strategies for communicating with and treating a "difficult patient".

The applied tasks in the second Inverted Classrooms were challenging, appealing to students' vocational meta-competence, provoking actions, reflections and discussions. Students received a most valuable message for their possible integration into world standard of professionalism – "be present, focused and engaged with your patient".

After conducting two Inverted Classrooms, the students were interviewed in an unrestricted format about their impressions and discoveries in the lessons.

Here below are the student's Inverted Classroom project assessment four top by popularity results:

1. The proven ability to communicate with foreign colleagues, to learn cooperatively and to have the exchange of the experience.
2. The activity and personal performance that they can show in the search and processing of relevant information;
3. The opportunity to try being a "real" doctor when communicating with the virtual (simulated by the actor) patient.
4. The productive application of familiar and previously unfamiliar study methods and electronic tools (laptops, smart phones, tablet computers) as well as remote communication and interaction technologies.

The main discovery statement of the students made was as follows: "The real patient can be very difficult to interact with. Real life communication with the patient is far from those "ideal images" the students had before. The real-life patient's peculiarities can leave an imprint the clinical conversation and, *ceteris paribus*, even interfere destructively with diagnosis process". This implies learning or designing special strategies for establishing/building a reliable interpersonal contact with the patient and organizing necessary exchange of appropriate vocationally significant reliable and useful information.

The students' feedback and assessment was very positive. Many students found Inverted Classroom an effective and useful tool for vocational education and revalorization of their learner's attitude. One of indirect results was also an observable increase in interest in English and special vocational publications in English.

V. DISCUSSION

Inverted classroom technology implies a change in the teacher's role. The teacher cooperates with students in the process of their learning, there appears a joint *contribution* to the learning process. The inverted model places great responsibility for learning on the students, giving them an incentive for genuine professional development. Educational activities can be led and controlled by students, and communication between students can become a propelling power of the process.

A. Monitoring the educational activity proved fruitful

A positive impact was made by the pre-organization – the students were divided into micro-groups in advance, all the instructions were given to them in advance, there was a clear

time plan of work, the students receive accurate questions for discussion and presentations. Internal motivation and self-organization were supported by the need to formulate accountable responses of groups in writing. The fact that all the results of the work were observable, being exposed to the internal educational resource also triggered their activity raised their motivation.

B. Involvement in practical target-centered activity stimulated self-directedness

Another positive feature is that students not only got acquainted with the theoretical material but also made a diagnosis of the level of development of empathy and answering questions. It actualized their own personal experience of communication, interaction and empathy. Thus, there appeared a personal involvement in the issue. The learners didn't feel that it is imposed by someone from outside. In addition, there was a combination of theory and learners' own, albeit limited to an extent, practical role-playing experience, which also increased their involvement in the work.

C. Formation of team-building and net-working skills

Each member of the group ("Quartet") participated in the work of the group. Restricted number of team members as well as sufficient amount of work to do and high level of involvement did not allow students to "sit out" and stick to passive position and attitude. Students received the opportunity to self-coordination in the group, the distribution of roles and taking responsibilities in the "Quartet". Such experience provided forming team-building and cooperative learning skills and exercising vocational soft-skills necessary for (international) networking and vocational performance in the contemporary world.

D. Self-reliance and self-organization

Another advantage of the technology is that students take more responsibility for their education and become more self-reliable and concentrated on vocational tasks solving. If at the beginning of the work in the audience, students asked the moderators many questions about how the class will be organized, then after 10-15 minutes, after receiving the chronogram of classes and tasks, and until the end of the class, the work became almost independently, with a high level of self-organization in micro-groups.

E. Some limitations of the method

The efficiency of the Inverted Classroom generally depends on the teacher's experience as well as a vast time and effort investment in pre-organization, while teachers' familiarity with modern digital tools is also in demand. Somehow, the first limitation may be viewed as voicing in favor of 'educational package' discussed. As the educational product was conceived as a transformer-module, one should admit that the success of Inverted Classroom application may sometimes also depend partly on familiarity with some students' educational/ cultural background as a pre-condition for accurate task-setting and optimal micro-groups formation as well as designing the style of teacher's or expert's tactful supportive intervention, taking cultural peculiarities into account. We recognized the focus on cultural diversity in

vocational education and training as one of great importance [cf. 26; 27] but it was not explored partly due to universalist approach, realized in the project TICOM.

VI. CONCLUSION

As it was stated earlier the project **TICOM** was aimed at the elaboration, creation and testing of a specially designed educative package for the common frame of vocational training of universal doctors' and medical staff *patient-centred communicative skills* and *meta-competencies*. The ability of the educational package for forming such skills have been confirmed successfully. The proposed by the participants of the project "educative package" due to its universalism and the use of advanced classroom technologies (modern educational technologies), in particular, informational ones, can be used by various organizations that are involved into healthcare education. It is assumed valuable not only in doctors training but also medical stuff and non-physical health professionals training. Target organizations include medical universities, medical colleges, various organisations, for example, "The Red Cross" and the others.

Experimentation with conducting Swiss-Russian Inverted Classroom proved fruitful in attaining such groups of targets as:

- a) Application of modern technologies to teaching medical students internationally;
- b) Providing interdisciplinary interconnectedness and integrity of final educational outcomes
- c) Uncovering axiological meta- disciplinary components of professional medical training;
- d) Developing interactive teaching methodology for vocational doctor-to-patient interaction training;
- e) Developing learning to learn component in modern task-solving vocational training;
- f) Developing self-directed learners' attitude and readiness;
- g) Developing learners' readiness for international life-long learning;
- h) Developing international students' vocational medical soft skills in English;
- i) Developing Russian medical students human capital internationally;

On a macro-level the experimentation may be viewed as part of such educational global processes as:

- a) Globalization and internationalization of education.
- b) Developing integrate approach to educational medical training, based on the idea of treating the whole patient.
- c) Teaching profession within frame of Inter-subjective, Inter-personal and International communicative paradigm.
- d) Establishing direct connections between various medical educational centers on planet Earth.
- e) Opening new opportunities of life-long learning and vocationalization of educational outcomes.

f) Development of International expertise in education and of vocational expert community.

g) Developing academic collaboration, academic mobility and academic exchange between countries.

h) International integration of existing vocational competences and international standards.

i) Introducing new teaching and learning digital technologies for internationally recognized educational outcomes.

The experience of Swiss-Russian academic collaboration helped to elicit such topics for further development of academic partnership as:

a) joint investigation of cross-cultural component of modern medical discourse;

b) application of bioethical principles in doctor-to-patient interaction within frame of international healthcare and medical help education and practices;

c) integration of professional hard skills and soft skills competences;

d) developing teaching focus on meta-competency of modern medical care professionals;

e) further developing international team-building and networking competences.

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