Analysis of forming of students' professional communication elements on the base of transporting and civil - engineering university according to the requests of potential employers

Olga Solnyshkova[1] and Inna Makarikhina[2]

[1]Novosibirsk State University of Architecture and Civil Engineering (SIBSTRIN), Leningradskaya, 113, Novosibirsk, 630008, Russia

E-mail: michmacha@mail.ru

Abstract. Prerequisites for students' professional communication elements forming on the base of civil engineering universities are investigated in the article. Students' professional communication elements must be used in their future professional activities. The workshop creative experience of interactive electronic educational resources development during the study possesses of geodetic disciplines on the basis of University of Architecture and Civil Engineering (Siberia) is described. The stages of students' processional communication formation in the process of interactive electronic educational resources creation by students and teachers are proposed. The offers to increase the efficiency of professional communication elements formation for students in the development of interactive electronic educational resources within the student creative workshop were made.

1. Introduction

The activation of interaction between higher education institutions and professional associations in conditions of regions intensive development contains the training of graduates who either are able to realize themselves in their professional field or ready for innovation as well. Federal State Educational Standards for higher education for civil engineering directions point to the need of students' competencies development to implement innovative detail. So, for 08.03.01 "Civil Engineering" direction the current standard provides for the professional competence "mastering implementing innovative ideas methods, producing and effectively managing people's work, preparing documentation for creation of a quality management system for production unit", are linking in its formulation innovative activity and ability to business communication in the professional field.

From the analyses of teachers' research materials in the scientific and pedagogical literature, it can be concluded that the students' preparation for innovation is not associated with the effectiveness of business communication. Our study was carried to substantiate the integration of innovative and communicative competencies. Methods, stages, organizational and pedagogical conditions for the formation of business communication elements for students of civil engineering directions of the State Educational Establishment of Higher Professional Education in the NGASU (Sibstrin) are considered in this paper.

We studied activating methods of workers creative activity in civil engineering enterprises, encouraging them to develop and implement innovations. The most popular method is [1, P. 306-307] project teams' formation from the number of enterprise employees. In the process of working on

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.
Published under licence by IOP Publishing Ltd

production project tasks, the role of business interaction is particularly high; the members of the project team are motivated to develop innovative methods to achieve the project's goals. Obviously, the success of such a methodology was proved in various companies work. This practice has been carried out successfully for fifteen years at the Department of Engineering Geodesy of the Federal State Educational Establishment of Higher Professional Education in the NGASU (Sibstrin). Student creative workshop of electronic educational resources "Geo-S" was created and successfully functions at this department. The students, united in project teams, develop electronic educational resources on geodetic disciplines in this workshop [2]. Among the developed electronic educational resources are the "Electronic Abstract of Lectures on Engineering Surveying"; "Electronic geodetic dictionary"; Animated educational films "Transferring a mark to the bottom of a deep pit", "Measuring lines length", "Transferring a project mark, etc., arranged in educational site geo-s.sibstrin.ru.

2. Theoretical Background of Communication Elements Forming

Development of interactive electronic educational resources included active interaction of students-developers and other second-year students who study geodetic disciplines. In a purpose to study the understanding of importance of business communication elements, two groups of the second year students, studding in "Civil Engineering" direction were made up. One group was made up of participants in the creative workshop "Geo-S", and another one consisted the same course students, who did not participating in various student creative associations . Groups of students (20 people in each) participated in the survey and questioning.

At first, the students of both groups were offered a questionnaire consisting of three questions.

1. How can students develop business communication skills in the process of teaching students?
2. What would be the most valuable for you in student projects participating?
3. Did you interact with future employers during training?

Both groups responded similarly on the first question: the students offered similar answers, mostly to self-education, additional training, and application of interactive

The problem of the essence misunderstanding and underestimation of business communication importance by students is constantly confirmed at regional industry forums, conferences, professional exhibitions such as «Development of the Siberian infrastructure / IDES 2014», «International Building and Interior Exhibition SIBDUILD 2016», «Exhibition of low-rise housing construction and landscape design Siberian House-2016», where the questions of student' training quality were raised during the debates of Civil Engineering universities representatives and representatives of construction production.

We have analyzed the potential employers claims to construction universities graduates with the help of personal management's interviews of construction companies and enterprises that produce construction materials and structures; during industry forums discussion (the 2d industrial forum "Modern Approaches to Modernization and Management of Housing and Communal Services of Novosibirsk and Novosibirsk Region", International Forum of Technological Development "TECHNOPROM", etc.). Questions about the satisfaction of potential employers developed in the process of training in the university competence were asked during those interviews.

The interview results within the framework of the round table " Personnel training is an urgent problem of the development and modernization of the civil engineering industry at the present stage" showed that, in general, graduates professional knowledge and skills of architectural and civil engineering universities are satisfactory, but almost every representative of the civil engineering complex enterprises spoke about the lack of practical professional skills and weak motivation to self-education in the professional sphere. In addition, there were some students' weak points, such as business paperwork, leading negotiations, and knowledge of English technical translation, which prevented the development of technical documentation for export materials, mechanisms and designs. In total, 15 heads of civil engineering companies in Novosibirsk and Novosibirsk region were interviewed by e-mail and video communication with representatives of civil engineering companies in Tomsk, Moscow, Berdsk, Sochi.

The results of the interviews are as follows: 76% of the respondents noted poorly developed general students' cultural competencies related to the ability to build up verbal and written speech, as well as readiness to work in a team; 21% noted the unsatisfactory general students' cultural competence associated with the readiness for social interaction on the basis of accepted norms, 3% found it difficult to answer; almost all respondents noted the unformed skills and skills of business communication. In order to investigate the problems of graduates' preparation quality, interviews were also conducted with young specialists who had come to the enterprises of the construction complex that year. For the interview, graduates of the bachelor's degree in the direction "civil engineering" and the specialty "Unique buildings construction and structures" were selected. A total of 38 graduates of the NSACU (Sibstrin) were interviewed. Graduates who did not take part in the scientific and creative associations of students during their studies at the university were interviewed.

According to the interview results had been analyzed, it became clear that almost all young specialists had received skills of business communication during their professional activity after their graduating from the university.

The Ministry of Education and Science of the Russian Federation recommends using professional industry standards to write basic educational programs and competences established by the university [4]. The draft professional standard, corresponding to "Civil engineering" [5] direction, details the requirements for compliance with specific functions in the conduct of business communications. Meanwhile, the current educational standard does not include any requirements for business communication in a competent manner, in addition to the competencies of innovation activity that we have analyzed. Thus, insufficient reflection in the GEF in the direction "Civil engineering" of professional industry standards requirements was revealed. Consequently, the educational process requires correction aimed at removing obstacles to quality graduates' preparation, demanded by employers and having a set of competencies necessary for successful professional activity.

There is practically no scientific and pedagogical literature devoted to preparing students for business communication conduction. The studies on the communicative skills of future engineers and other specialists are quite numerous and reflect only general cultural aspects of communicative competence. To develop the skills of oral business communication, interactive forms and methods are used, such as: rhetorical conversation [6], case method [7], but it is worth noting that the peculiarity of engineering education is rarely taken into account. Our study was based on the comparative analysis of concepts[8], suggests systematically using interactive pedagogical technologies in the form of business games, discussions, design works, etc., but there was no a word of business communication mentioned in this work. Skills and habits of business communication are determined by the types of business communication (business conversation, business negotiations, meetings, discussions, business correspondence, presentations), as well as professional functions and operations, including teamwork skills.

Foreign languages communication plays a special role in this process. It actively develops not only young specialists' professional skills, but also the ability to inquire foreign experience.

With the help of computer programs every teacher can create a learning environment. The term "learning computer environment" is used by many researchers in their works [13].



figure 1. Four Basic Skills

One can cite numerous and quite convincing examples that prove the effectiveness of electronic textbooks use in the learning process:

- at the stage of educational information presentation;
- at the stage of learning - aids studying in the process of computer interaction;
- at the stage of competences repetition and retention (competences);
- at the stage of interim and final control and self-learning outcomes achieved;
- at the stage of assessing learners' results, education process itself, and its results through dosing study material, its classification, ordering, etc [13].

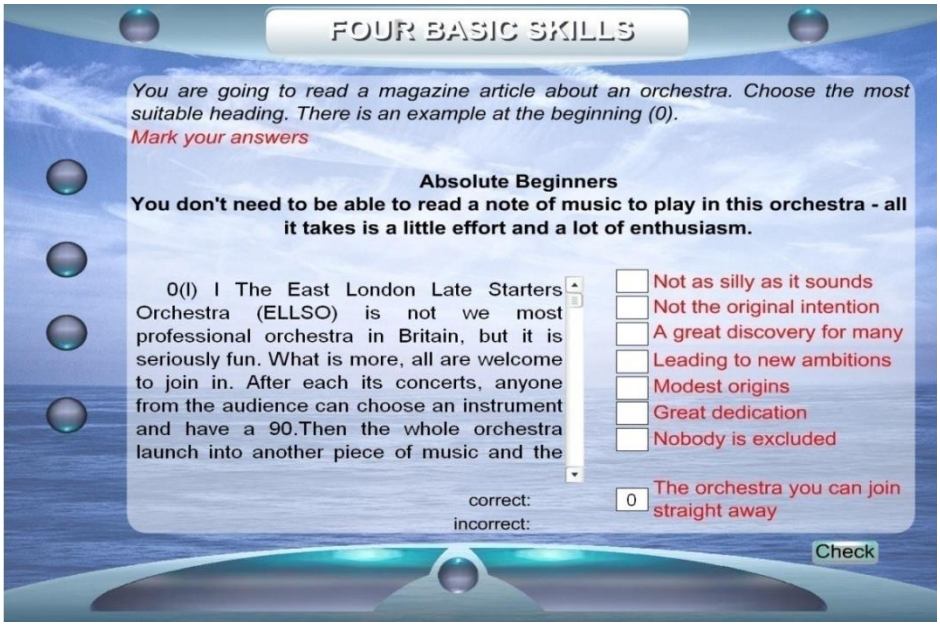

figure 2. Four Basic Skills. Reading

3. Results of Experimental Work

Students who participate in the training in the university in various student associations acquire and realize the importance of business interaction practical experience. For example, in the creative

workshop of electronic educational resources, students receive the following skills of business communication: presenting their point of view using professional terminology; collective discussion of the working draft with the adoption of a general solution; compilation of accompanying documentation for the project for further review or presentation at a conference; maintenance of project documentation; presentation of a potential customer project; skill of business negotiations at various levels; skill summary of a problem or task; ability to study and submit documentation in a foreign language, delegating authority to subordinates to present their work to a manager.

It is also important that students develop interactive educational resources in the creative workshop. At the same time, students should communicate not only with each other and with a teacher, but also by questioning and questioning, taking into account the opinion of other students of the stream, in order to participate in communication with many other persons in the institution. Communicative skills are developed during the process of interactive educational resources working out, as interactivity is an important condition for the effective use of learning tools [9, 10].

Students together with the teacher actually become co-organizers of the educational process; it is an innovative pedagogical practice in Russia and abroad. Starting with the formation of students creative innovative activity, considering them as partners in the learning process [11], teachers can proceed to the development and implementation of forms, methods or tools offered or developed by the students themselves, which adapts such means to their consumers even at the stage of their creation. As students' developed means can be various electronic educational resources, for instance, diagnostic materials, lecture notes, websites. An example of successful application of electronic educational tools developed by of Harvard University students is a set of online tools in the field of astronomy and physics [12].

Within the creative workshop "Geo-S" the students' individual experience is formed together with communication skills and skills of business communication. This form of elaboration of business communication elements can be realized in various student creative and scientific associations within the framework of training in the university.

We outlined the stages of forming students' skills of business communication in a creative workshop in the process of electronic educational resources developing.

1. The reporting and communication (primary-communication) stage

This stage often coincides with a student adaptation to the design method of work. At this stage, project team members are trained in the initial skills of business communication, a report to the project coordinator, to the workshop manager. Students receive the first skills of describing the work performed both verbally and in short messages, For example, in a period after a project beginning, students can already understand if they need to solving some simple problems, they first have to ask the coordinator of the project, then the leading workshop coordinator (usually a graduate student with a high level of responsibility and extensive experience in various projects), and only then, to involve in the solution of problems and tasks of the workshop manager. At this stage, project implementers are trained to express their opinions and give their reasons.

2. Command and communication stage (command communication)

At this stage a team spirit and community of interests appear. At this time, students learn to communicate in groups within the team, exchange technology from each other. This stage is characterized by active correspondence in social networks within the team and with the project coordinator. At this time, the students send all the team members innovative developments in their direction, exchange information on technologies, software and various devices. Regular communications within the project teams are built up; schedules of the main stream students' interaction are observed. At this stage, the most erudite students with additional skills are identified. Such members are often asked for help and advice by the project teams members, with a respectful relationship between them.

3. The external-communication stage (the stage of open communication)

At this stage, members of project team are trained to communicate with members of other teams of other projects. During this period business relations of students with similar collectives from other universities start to be tied up. This process is possible only if the creative workshop actively participates

in various conferences, roundtables, discussions on the topic of activity. Students learn to present their products at these kinds of events, to defend their point of view in discussions and debates. This stage is valuable because students realize that they have like-minded people whom they can speak the same business communication language with. They practice their skills of business correspondence, working with conferences organizers.

4. Guidance communication stage (the stage of awareness of responsibility for the team)

At this stage, students become managers of their own projects, recruit their teams, and train team members with communication skills. This stage is the stage of taking responsibility for a project result, responsibility for their groups' coherence. At this stage, project managers learn to smooth conflict situations within the team, share roles in the team, assign reporting periods and be responsible for the members of their team or to the head of the workshop. At this time, students learn to motivate participants in joint activities for a quality results, their self-reliance is shown in conflict resolution within project groups. They offer proposals for the commercial use of innovative products.

In our opinion, it is necessary to follow the organizational and pedagogical conditions in the educational process to make implementation of these stages more effective.

1. The use of problematic professional situations of business communication, the interactive forms inclusion in conducting training sessions that are reproduced in communication educational context that has uncertainty signs of the situation.

2. Forming students' strategic and tactical professional and communicative skills.

3. Students realize their communicative behavior peculiarities in the conditions of standard and non-standard professional situations, providing high motivation for mastering strategies and tactics of such behavior.

4. Conclusion

Thus, we made the following conclusions: it is necessary to introduce contextual methods starting from the first year, which allow students present their future professional activity, and this can be done in the classroom in various subjects. It is necessary to develop a network of student design bureaus in the universities, innovative design entities, creative workshops, research laboratories, and youth research and production associations, in order to develop presentation skills, compile reports, use the latest technologies, materials and software. Such student associations can later become small innovative enterprises. It is necessary to actively practice foreign literature use on special subjects in order to attract students' attention to foreign innovations in the construction field. Formation of students' skills and habits of business communication from the first to the last year, requires additional analytical research, which we began to conduct in the NSACU (Sibstrin).

References

[1] Gorfinkel V Ya and Popadyuk T G 2013 *Innovative management: a textbook for undergraduates studying in the direction of preparation "Management"* (Moscow: UNITY-DANA) p 391

[2] Solnyshkova O V 2013 *Technology for the development of interactive electronic educational resources for the preparation of students of architectural and construction directions Fundamental research* **10** part 10 pp 2295-2299

[3] Mokretsova L A, Dudysheva E V and Manuzina E B 2015 *Preparation for innovative entrepreneurship in a liberal arts college in regional social and economic conditions: a collective monograph* (Biysk: FGBOU HPE "AGAO") p 160

[4] URL: http://www.petrsu.ru/Structure/fpk/met_rek_razr_osn_prof_prog.pdf

[5] URL: http://archiv-nostroy.ru/sitePage.do?name=advertisment&id=161

[6] Krasilnikova I G 2013 *Competence approach to teaching oral business communication Science and education in transport U I* **1** pp 396-397

[7] Astapenko E V and Kokurina N V 2010 The role of the case-method in teaching business communication skills *Perspectives of science* **9(11)** pp 5-9

[8] Rydanova E N 2006 To the problems of communicative skills of a civil engineer *Proceedings of the Volgograd State Pedagogical University* **1** pp 55-57
[9] Lazarenko I R, Salii T M and Makarikhina I M 2013 *Using New* Generation E-Books in High School Educational Process, Including Faculty of Teachers' Development *Middle – East Journal of Scientific Research* **15** pp 1155–1159
[10] Dudysheva E V and Solnyshkova O V 2013 Interactivity of electronic means of teaching in vocational education *World of Science Culture, Education Gorno-Altaisk* **3(39)** pp 98-100
[11] Temerbekova A A and Shishmintseva A P 2012 Formation of the graphic culture of students through interactive learning tools on the material of spherical geometry *Information and education: the boundaries of communications* U **4(12)** pp 42-144
[12] Healey M, Flint A and Harrington K 2014 *Engagement through partnership: Students as partners in learning and teaching in higher education* (Heslington: The Higher Education Academy Publication) p 76
[13] Sanders N E, Faesi S and Goodman A A 2014 A New Approach to Developing Interactive Software Modules Through Graduate Education *J. Sci Educ Technol* **23** pp 431-440