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Communicative patterns for IT professionals as means of mastering communication skills

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Abstract. The paper deals with the aspects of English communicative pattern implementation into IT professional training. It is emphasized that the communicative pattern usage enhances prompt and fluent profession-related real-life communication and it is the essential part of education of IT specialists. Peculiarities of communication in the IT environment are highlighted. Considering typical situations and issues of communication the guidebook which contains recommendations and communicative patterns for IT undergraduates both for oral and written communication has been developed. In order to evaluate the purposefulness of the guidebook implementation in IT specialist training, two surveys (among lecturers and among undergraduates) of six universities have been conducted. The guidebook has proved to be suitable for practical classes, independent learning and laboratory works in humanities and profession-related disciplines. The survey conducted among English teachers has proved the increased interest, higher motivation and willingness to participate in communicative tasks crucial for specific employment.

1. Introduction

Ukrainian IT professionals successfully compete with specialists from other countries in the European and world labour markets. Software development, for instance, is a quite complicated process, so software products are rarely created by individual specialists, software engineers have to work in groups and teams [1–4]. In their professional activities IT professionals must ensure communication with customers, colleagues, project managers, board and team members in their own team, directly and remotely, so communication in a native language or foreign languages is an essential part of the productive work of software engineers.

The situations when IT professionals work in an international team, which is formed for a specific project, are quite common. The main grounds for selection of specialists for such a project are not the geographical location of all participants, but correspondence of high qualifications, logic, analytical, mathematics and problem-solving skills, professional knowledge and soft skills of a particular specialist to the project.

2. Peculiarities of communication in the IT environment

Numerous studies on distinguishing features of the current generation of students and young professionals have been presented in many international and national studies: Net Generation



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Survey [5], The Net Generation: A Strategic Investigation [6], Grown Up Digital [7], Nielsen NetView Audience Measurement Survey [8], and Technological preparedness among entering freshmen [9]. Summarizing the results of these studies, R. Berk had identified twenty common characteristics of this generation of students and young professionals [10]:

- technological savvy – the modern generation is quickly mastering new technologies or digital devices; they expect that information will always be at hand;
- dependence on search engines – students begin to search for information using search engines, re-evaluate their skills in finding and evaluating information;
- interest in multimedia – young people are accustomed to entertainment, speed, aggressive sound and visual accompaniment of any information, prefer interactive media to passive television;
- “creators” of Internet content – even schoolchildren and humanities students develop websites, publish blogs with photos and original creative works, upload their own videos to YouTube every day;
- receptivity to inductive teaching methods means that students prefer practice over oral or written instructions;
- multitasking in everything – young people are able to perform several tasks simultaneously;
- “visual” communication involves the total visualization of information and the use of images, animated images, stickers and other features of messengers and social networks to reflect feelings or their own attitude to a particular event;
- emotional openness – students easily express their feelings, they are open to meeting new people, share personal information and publish their stories online on blogs, wikis, social networks, magazines and other social media;
- teamwork and cooperation – representatives of this generation work better in a team compared to representatives of previous generations;
- electronic record keeping – young people work quickly with the keyboard, type notes, messages, essays and term papers on computers, laptops or other digital devices.

Information technology as the least communicative field is rightly considered to be one of the most resource-intensive and complicated professions. IT specialists work not only with the newest technologies, but predominantly they are to interact with numerous people in the company and outside the company (colleagues, managers, customers) to create a successful product. The human factor along with the technical factor often becomes the reason of the low-quality software product [11]. Among other factors according to O. Titova and N. Sosnytska [12] intelligence, creativity, motivation, will, productivity and reflection are basics of engineering profession which is equally implied to information technology.

Since most of communication in the IT environment occurs with the use of information and communication technologies, it is obvious that specialists in such an environment communicate directly (“human – human”) or indirectly (“human – digital device – human”). Indirect communication is commonly more preferable for the IT environment as a specialist has to understand the task and implement it accurately. As we stated in our previous research, almost 90% of communication in the IT environment is indirect, that is, the asynchronous symbolic communication system as opposed to the verbal one is dominant [13].

In case of indirect communication an IT specialist receives a conventional message which corresponds to the corporate ethics and regulations. The response is based on the phrase patterns, which help to describe tasks and errors, get the formalized answer, fix the problem or follow the guideline in the message. In the event of direct communication emotions can prevent quick problem-solving.

According to the mode of responses communication within an IT environment can be synchronous (face-to-face communication, meetings, instant messaging, chatting) and asynchronous (e-mail messages, newsgroups, task and time control systems, chats, correspondence etc.).

Communication types and techniques can be classified according to their formality. Pikkarainen et al. describe formal and informal communication types. Formal communication techniques include group, steering group and milestone meetings, status meetings, formal meetings, formal documentation, and a source code. Informal communication techniques comprise face-to-face discussions in co-located or distributed teams, informal discussions by use of various communication channels, including ad hoc communication [14]. W. Reinhardt emphasizes that “informal communication activities seems to make the difference between just working and great experience projects” [15].

Particular attention should be paid to the types of communication in terms of its content:

- cognitive communication which is aimed at obtaining necessary information for self-development. This type of interaction is relevant for specialists in software engineering, computer science and computer engineering as these professions involve self-education throughout life due to the rapid change of technology;
- material communication is aimed at obtaining material benefits, in particular, for the work performed and the conclusion of mutually beneficial agreements. This type of communication should be well developed for a successful career in the IT field, which is manifested in high wages, migration of specialists between IT companies, concluding agreements with customers taking into account risks;
- motivational communication refers to motivational actions, when the need for something (recognition, assistance, etc.) forms the need for an IT specialist to be in contact with other people (friends, colleagues, customers, like-minded people);
- activity communication relates to the field of personality and has a specific purpose: to expand the boundaries of the essence of a specialist, the disclosure of their individual potential for professional growth, transition to another, higher position or role in projects.

The analysis of professional activities of software engineers according to the Jung’s theory of personality taking into account professional deformation and natural ability to certain profession allows us to state that the positive traits of software engineers are perseverance, persistence, resilience, as well as the ability to concentrate more deeply and feel the task, which are inherent in introverts. Thus, most software engineers are introverts and they communicate with introverts in their professional activities, and therefore they must understand the peculiarities of this type of personality in their interaction and communication.

For introverts, it is best to work on long-term projects in which they can be fully immersed, there is a need to prepare the workplace and be able to isolate themselves from the outside world (headphones, partitions, multiple monitors, even if they are not urgently needed). This type of personality works better on a pre-prepared plan (they know the time and topics of meetings in advance, have a plan of tasks for the day), distribute tasks and have some time reserve. It is especially important for introverts to choose a convenient communication system for them, namely messengers, electronic mail, stickers with notes instead of personal meetings.

However, in order to succeed in the IT profession in a modern corporation, certain traits of extroverts are needed, as the corporate culture of a modern IT company includes open offices, regular meetings, or mob-programming practice [16]. Therefore, introvert specialists need to be taught to gradually expand the circle of communication, gain credibility, offering help to colleagues and asking for help to establish contacts.

Thus, to train a highly qualified specialist in software engineering, computer science and computer engineering at higher educational institutions it is crucially important to identify

typical situations and forms of communication of software engineers, to form templates and patterns for communication in each situation and to create conditions to practice these patterns.

M. Bartyzel [17], studying communication among software engineers, has noted that conversational patterns are techniques for managing conversation, asking questions, finding needs and explaining expectations, which are called, organized and described algorithmically for their direct use by specialists. It should be noted that it is important for an IT specialist not only to master a certain set of phrases that will help solve certain problems quickly and professionally, but also have certain psychology knowledge.

In our opinion, knowledge of psychology is needed primarily for communication processes. It is necessary for learning and a successful professional activity to master affective strategies aimed at reducing anxiety and stress, forming positive attitudes, overcoming fatigue, controlling the time of the task, etc.

At the same time, it is necessary not only to provide theoretical knowledge, but also to apply it in practical classes in the form of trainings, business games and using other methods, as these strategies directly affect the quality of communication and, consequently, professional problem-solving.

To communicate effectively the following significant aspects should be taken into account:

- motivation – internal motivation to communicate as a universal and professional value and motivation to develop teamwork skills, values for cooperation and solving professional problems through the organization of effective communication,
- cognition – knowledge of psychology of communication, teamwork, patterns of professional phrases,
- communication activity – the ability to use patterns to solve professional problems, the ability to organize communication both in personal communication and mediated by ICT,
- performance and evaluation – focus on communication in order to obtain a specific professional result, assess problems with communication and determine a new communication strategy.

3. Communicative patterns as means of training communication skills

Communication within an IT environment as S. Kumar states is to be strategically planned (planning, preparing, starting a discussion), but interlocutors are to think tactically, improvise and make choices about their communication to get the excellent result [18].

To analyse the efficiency of application of communicative patterns as means of training communication skills the following questions have been arisen: 1) improvement of communication skills and professional vocabulary due to usage of special teaching aids (a course book and supplementary materials); 2) impact of the motivation increase on the student knowledge level; 3) adequacy of student self-assessment as to their discipline advance. To answer the research questions the following methods have been applied: surveys and questionnaires, focus groups (teachers and students), expert evaluation.

Taking into account distinguishing features of the current generation of students and young professionals, the peculiarities and types of communication within an IT environment, the aspects of successful communication, considering typical situations and issues of communication we have developed the guidebook which contains recommendations and communicative patterns for IT experts both for oral and written communication. Communicative patterns can be defined as logically complete balanced phrases to control the conversation, the use of a sequence of which leads to the desired result without losing and distorting the content of messages.

The guidebook consists of 12 units on topics, situations, problems and tasks that arise during professional activities in the process of software development. Each unit contains guidelines and patterns for the most typical workplace situations: writing letters within and outside an

IT company, writing cover letters, curriculum vitae and resume writing, job interview, job hunting, teleconferencing, making presentations, meetings, discussing a profession, teamwork, and customer service. The communicative patterns are presented in two languages: English and Ukrainian.

The guidebook is not just a phrasebook with the list of ready-to use conversation phrases; it includes certain useful recommendations on managing particular psychological, organizational and interpersonal issues which can emerge in professional activities of IT professionals.

For instance, in the “Customer service” section certain useful advice on handling complaints is given with some focus on psychology of customers, dealing with problems and finding efficient solutions. Communicative patterns are grouped into subgroups (acknowledging the customer’s emotions, collecting information about the problem, apologizing to the customer, offering a solution etc.), and several options are given to make a choice to make communication more efficient and successful.

The guidebook can be used at practical classes at higher educational institutions during group discussions, round tables, role plays, brainstorming, the case method and others. The book can be also useful at workplaces during trainings aimed at team building, trust building and team communication; development of skills to negotiate, resolve conflict situations; development of communication management (regulation of basic communication strategies; regulation of relations with the customer; management of anti-crisis communications; creation of a favourable socio-psychological climate; change management).

In order to evaluate the purposefulness of the guidebook implementation in IT specialist training, two surveys (among lecturers and among undergraduates of six universities) have been conducted.

The objective of the lecturers’ survey has been to estimate the suitability of the guidebook for enhancing specific English skills of the students majoring in software engineering, computer science and computer engineering.

Depending on the prospective tasks, IT undergraduates should be informed by their instructors about the priority of the typical communication activities and encouraged to practice them more intensely. So, for instance, software engineers mostly correspond with their superiors and inferiors in writing, work independently or in pairs. The computer science graduate sphere of their social activity is much wider and includes numerous professional tasks like collaborating, providing services to non-experts, sometimes even teaching. For this reason, four main communication aspects have been concentrated on while teaching the mentioned above undergraduate categories and these aspects have been tested separately.

The guidebook provides all the necessary links to authentic websites with English interfaces in the reference section, where practicing both synchronous and asynchronous communication is possible. The tasks for enhancing written formal and informal communication have been introduced as essays, blogs, forums, business letters which should be compiled of the patterns introduced in the guidebook (at the first stage – with provided bullet points, but with no strict time limitation and no assessment; at the control stage – as a writing task in an exam card).

Oral communication includes, first of all, training quick information reception and comprehension. Secondly, the objective has been to prepare the students to spontaneously react verbally. Multiple role plays, producing and dramatizing dialogues and polylogues have been reproduced by students using the provided patterns in current training.

The more complex task has been to react to partner’s lines in handouts in order to lead the conversation to its logical final according to a provided script in Ukrainian. The example of the dramatizing task is when one student gets a card where details on order placement are given (e.g. development of a website of the sportswear online shop in the short period of time and meeting uncommon customer needs). The first student has got a set of selected communicative patterns on the script, but their partner has to select and order the patterns from the vocabulary box

matching the given lines of their counterpart. The rapport of the negotiation process depends on the second student's choice if they prefer communicating in more polite manner or using less official style.

The most challenging but the most appreciated due to its profession-related nature task included improvisation of all the communicators – an urgent real-life situation which needs to be attended immediately. In contrast to the previously described script partner tasks in the improvisation tasks the student communication is not supported by pattern prompts. They are given cards with a puzzling task (e.g. defective computer equipment causes negotiation disruption and an IT expert has to take efficient measures to please the superiors). The student has to get to know the details of the equipment failure, precisely explain the possible causes, give instructions on how to deal with the problem and provide recommendations on prevention of the mentioned situation reoccurrence).

All the other students present in the classroom are welcome to react verbally and to speak their lines as disturbed co-employees in order to complicate the initial task or to support the leading speaker. Such tasks increase motivation to learn the obviously useful patterns, show relationships within the team and teach collaboration under various real-life conditions. Teachers usually appreciate the possibility to set an example of crucial necessity of fluent speaking skills and quick verbal reaction in polylogues for not sufficiently motivated students.

All the mentioned above activities are aimed at student preparation for participating in a business game involving all the students of the group and their English teacher. The script supposes a computer classroom as a location, requires the Wi-Fi access and a whiteboard. The participants should be reminded in advance how to use the screen demonstration function of a certain web-conferencing tool.

The locations of the three act play are the CEO office, the technical support department and the distant participant's office. The actors personify the characters according to students' communicative skills, the advanced speakers have to react spontaneously and have more voluminous parts. The following roles are to be allocated: the owner of the IT company, the CEO, a technician, a CEO's secretary, a web-developer, a system analyst, a manager, an HR-manager, a trade-union representative. The particular emphasis should be put on the choice of a player acting as a video conference counterpart who has allegedly pronunciation issues (stressing a wrong word in a sentence, strong accent, mispronunciation of certain sounds). This student should be able to react differently (e.g. expressing anger, embarrassment, guilt) and provoke partners' usage of adequate communicative patterns.

The mentioned above characters are to interact in the sequence of polylogues synchronously and asynchronously. The theme of the business game is the annual general meeting of the company. Most of the actors have to prepare a short report on results for the meeting, while the owner and the CEO have to sketch an agenda for the next year. During the staged meeting prospective outcomes of the year are discussed, bonuses and reprimands are given. The mentioned above conversations drafts encourage a great variety of using patterns for praising, disapproving, criticizing, apologizing etc. The preplanned scenarios scrutinized by the game participants in advance and augmented by their vision of their character personality are supported by improvisation when all the players underlie the equal conditions and depend on each other's verbal proficiency.

The role game foresees written correspondence alongside with oral communication: prepared and current personal students' notes, various lists, memos, and final minutes taken by the CEO's secretary (admittedly acted by the English teacher who circulates between groups and coordinates the game process if necessary). The suggested game duration is up to 60 minutes, and the rest of the class time is devoted to evaluating, discussing the final script and forming the list of ideas for the next possible business games.

The final module assessment of the student ability to communicate their intention included

(in spite of the variety of practised communicative tasks) using freely the learned patterns according to the provided script, but students who feel confident at the end of the mentioned above English course could volunteer to improvise in a staged conversation with their teacher reflecting the professional environment atmosphere.

In order to analyse the English lecturers’ perspective on the communicative skills significance for graduates’ efficient functioning in the professional environment the survey has been conducted among English teachers of Dmytro Motorny Tavria State Agrotechnological University, Bogdan Khmelnytsky Melitopol State Pedagogical University, Classic Private University, Zaporizhzhia National University, Lviv Polytechnic National University, Luhansk Taras Shevchenko National University. The English teachers training software engineering, computer science, informatics, computer engineering and information systems and technologies students have been asked to estimate interdependence of involving students in English communicative activities both within classes and in independent learning and their readiness to get engaged voluntarily as participants gradually gain more communicative experience. The more tasks student do (every English class in the winter term at Dmytro Motorny Tavria State Agrotechnological University includes at least 3 communicative activities, the total amount equals 75 tasks in accordance with the term syllabus), the more confident they feel in communicating with each other and their colleagues.

35 of 40 respondents (87%) have noted the positive effect of communicative task application in the English course for IT students. Placing the emphasis on the specific communication aspect with students majoring in more or less introverted professions ensures the increased interest, higher motivation and willingness to participate in communicative tasks crucial for a specific professional position.

Nevertheless, the difference in indices of the mentioned above majors should be noted: prospective computer engineering specialists are less inclined to get motivated by the interaction process since their professional requirements are the least communication-intensive and undergraduates are least predisposed to train customer-oriented communicative strategies for working mostly in “human – digital device” systems. Correspondingly, the computer engineering students least advance both in acquiring English communication skills and boosting English vocabulary. That is why students majoring in computer engineering have been asked to contribute to the English class content and their list of preferable communicative activities is going to be considered and logically implemented into the syllabus for the next study year.

The progress in the communication activities of software engineering, computer science and computer engineering students according to their test results is presented in table 1.

Table 1. The progress in the undergraduates’ communication activities.

	Software engineering	Computer science	Computer engineering	Average
Formal written communication progress	83%	78%	81%	81%
Formal oral communication progress	82%	86%	78%	82%
Informal written communication progress	87%	81%	84%	84%
Informal oral communication progress	85%	91%	82%	86%

Separately, the student vocabulary knowledge progress after scrutinizing the guidebook in the English for specific purposes course has been monitored. The average indices are presented in table 2.

Table 2. Vocabulary knowledge progress (average of 6 universities).

	Receptive knowledge	Controlled productive knowledge	Free productive knowledge
Module test results	78%	74%	67%

While checking receptive vocabulary knowledge students have been given short texts for understanding the meaning of the highlighted English patterns from the context and giving their precise translation. Controlled productive knowledge is tested in close tests and the positive grade means that a student is able to choose one pattern of four that fits the required meaning. Free vocabulary productive knowledge supposes speaking out freely and producing the right grammar and syntax forms in order to express the required meaning.

The second question of the survey has been the guidebook suitability for different learning activity types. Practical classes have been ranked first by 89% of the responders, due to the synchronous and dynamic nature of communication tasks involving the patterns. 82% of the surveyed lecturers have ranked the project activities in independent learning second (when one compiler or team partners deliver their self-study creative product). Laboratory works have been ranked third by 78% of respondents due to the reproductive activity nature when a provided algorithm is followed.

The third question of the survey among the universities' teaching staff has contained the request to suggest related disciplines where the guidebook (possibly, with the emphasis on the Ukrainian language component) could be implemented. The suggestions included English for specific purposes, business English, English for scientific purposes, profession-related Ukrainian, management disciplines (e.g. the section of patterns for dealing with complaints), psychology and business Ukrainian (e.g. for studying intercultural aspects in professional environment).

The students learning from the guidebook have been asked to participate in the survey, too. The results of the self-evaluation of software engineering, computer science, computer engineering students are presented in table 3.

Table 3. The results of student self-evaluation of the English skill progress.

	Software engineering	Computer science	Computer engineering	Average
Vocabulary knowledge boosting	85%	89%	84%	86%
Spontaneous verbal reaction in profession-related situations	79%	82%	85%	82%
Acquiring new information	97%	96%	98%	97%

86% of all the respondents of the Google-form questionnaire have pointed out their English vocabulary knowledge improvement after completing the communicative pattern guidebook, 82% of respondents indicated increased readiness to spontaneously verbally react in profession-related situations, 97% of respondents pointed out acquiring a great amount of new information about verbal behaviour of potential English speaking counterparts. The student self-assessment results are completely in accordance with the module test grades which confirm the adequacy of the students' vision of the progress in English and awareness of the communication skills necessity in their professional life.

4. Conclusions

Facing the challenges of integrity into the multicultural professional environment current undergraduates in Ukraine are aware of the necessity to intensely improve their foreign language communication skills. This trend is more than urgent for prospective IT specialists who must overcome their psychological and language usage obstacles to communicate their professional intentions. They have to communicate with customers, colleagues, project managers, board and team members in their own team, directly and remotely.

Considering the template nature of professional tasks delivering communicative patterns is the most productive and effortless way of ensuring their verbal and symbolic activities. These patterns are logically complete balanced phrases to control the conversation, the use of a sequence of which leads to the desired result without losing and distorting the content of messages.

The analysis of distinguishing features of the current generation of students and young professionals, the peculiarities and types of communication within an IT environment, the aspects of successful communication has been conducted and considering typical situations and issues of communication the guidebook which contains recommendations and communicative patterns for IT undergraduates both for oral and written communication has been developed. The guidebook has been implemented into IT specialist training at six Ukrainian universities. Successive surveys have demonstrated the significant progress in the communication activities of software engineering, computer science and computer engineering students. The guidebook has proved to be suitable for practical classes, independent learning and laboratory works in humanities, in profession-related disciplines and, most of all, in English, business English and English for specific purposes.

The survey conducted among the English teachers has proved that focusing on the specific communication aspect with students majoring in introverted professions results in the increased interest, higher motivation and willingness to participate in communicative tasks crucial for a specific position. The described in the paper issue of motivating introverted students who prefer and aim at the "human – digital device" professional environment and avoid training people-oriented communicative strategies is a significant concern and an imperative for teachers to consider. Nevertheless, the average indices of all IT students and the current results of computer engineering students confirm the successful implementation of communicative objectives.

The results of the student questionnaire have substantiated the positive effect of training communicative strategies within the English course. More than 80% of all the student respondents have pointed out their English vocabulary knowledge improvement, increased readiness to spontaneously verbally react in profession-related situation and acquiring a great amount of new information about verbal behaviour of potential English speaking counterparts.

Communicative pattern usage for English skill mastering enhances prompt and fluent profession-related real-life communication and thus is the essential part of the productive work of IT experts.

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