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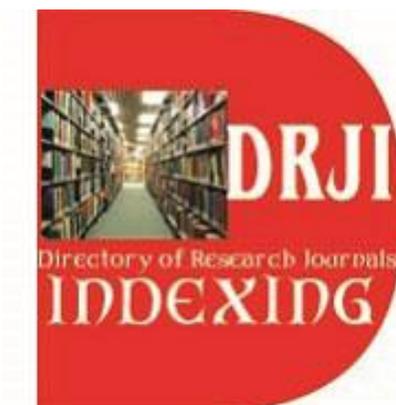
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## Innovations In Science And Industry-Specific Education

Elena A. Dzhandzhugazova<sup>1</sup>, Ekaterina A. Blinova<sup>2</sup>, Liubov N. Orlova<sup>3</sup>, Marianna M. Romanova<sup>4</sup>, Anna R. Davydovich<sup>5</sup>

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**Abstract:** The article focuses on the research of innovations in education and science, which are regarded in the light of searching for a useful correlation between traditional and new approaches to the development of education. To achieve the objective of this research, i.e. to identify the role of innovations in education and science, the authors used the following research methods: systematization, analysis and synthesis, concretization and generalization, comparative analysis and observation. The analysis of the current state of the Russian higher education has revealed a stable tendency to reduce the number of noncompetitive educational establishments incapable of being involved in modernization processes, as well as a new demographic threat a decrease in the number of employable citizens and an increase in the number of pensioners. Based on the results of the study, the authors offer their reasoning for three key innovations in the spheres of science and education: the global competition for talents, the growing democratization of education and the demand for educational programs by older people. All the above is a way to revise the strategy of education development, taking into account the new prospective trend involving universities in a large-scale preparation of programs for third age people (pensioners), whose number is increasing steadily.

**Keywords:** progress, innovations, education, educational programs, new economy.

### Introduction

Progress and antiquity are two self-sufficient and equant poles, which exist simultaneously in people's lives. Even today, at the end of the third technological revolution, one may find simultaneously existing elements of all types in the society: from a primitive society to a post-industrial one, although a movement towards modernization becomes increasingly evident. Nevertheless, we understand that the world is diverse, and the human society is far from being homogeneous. At the same time, the world has been changing more and more rapidly over the past decades, and the changes are affecting science, education and the professional sphere in a more profound way.

We have already witnessed a large-scale alteration of employment forms a factory conveyor line has been replaced by many flexible types of employment which do not require personal presence, but provide a stable income. Self-employment and various types of freelance work put about 40 % of employees outside the zone of traditional employment, which undoubtedly requires a serious rethinking of approaches to employment and social care (Grozovsky, 2016). At the same time, serious contradictions arise between the key trends. On the one hand, the era of pervasive IT development faces the problem of "superfluous people"; on the other hand, the individual still holds the main value! Today one needs to foresee the vector of change and learn to manage changes or at least influence them. A Swiss economist K.M. Schwab (2016) sees three reasons why today's changes should not be considered as a continuation of the third technological revolution, but rather as the beginning of the fourth one: the rate of changes, their scope

and the systemic nature of their consequences. This period is characterized by the convergence and synergy of several large-scale technologies: nanotechnology, biotechnology, IT and 3D printing, artificial intelligence, new materials and robotics. Undoubtedly, new professions and qualifications will be required, and it is "irreplaceable competences" that will become the most valuable for people (Schwab, 2016).

One of the most important qualifications, according to experts, will be the so-called "purpose driven leadership". In 2025, millennials (generation Y) will be the basis of the workforce; the sense of purpose in their activities and an authentic leadership will become the most important factors in their choice of the way of their self-realization (Sokolova, 2017).

The matter of forming new qualifications pertains, first of all, to innovative education development, which in different periods of the civilization solves different tasks: from providing general literacy to educating intellectuals, but generally its target is the individual and it exists exclusively for the individual, and not vice versa! Undoubtedly, at different stages of the society development different requirements are imposed on education as an important social institution, as they are imposed today when competitiveness must be maintained in a new rapidly changing environment (Zaitseva, 2016; Kvon et al., 2017).

The following factors influence the development of educational services, both in Russia and in the world (Romanova & Chernova, 2014): a significant increase in the number of educational organizations; an increasing demand for quality education services; the rapid emergence of new types of services in the educational process; the implementation of education services via online resources; various training programs in the world; the change of consumer segments of education services from the point of view of their age, etc.

### **Materials and Methods**

To achieve the purpose of this research, i.e. to identify the role of innovation in education and science, the following methods and approaches were applied: systematization, analysis and synthesis, concretization and generalization, comparative analysis; methods of collecting information, monitoring. The informational base of the research was scientific publications in recognized scientific media; research and design materials of scientific division of Plekhanov Russian University of Economics.

The theoretical and methodological basis of the research is scientific works on innovations and the innovative development of economic entities. An innovative activity is multifaceted and covers a wide range of activities, while innovations themselves can be manifested in various forms. Innovations are inherent to all areas of activity, including education (Dzhandzhugazova et al., 2016). Currently, there is a fairly large number of definitions to an innovation and an innovative activity and quite an extensive classification has been developed. Figure 1 shows the author's idea of the innovation space a totality of all implemented innovation processes at all levels of the economy.

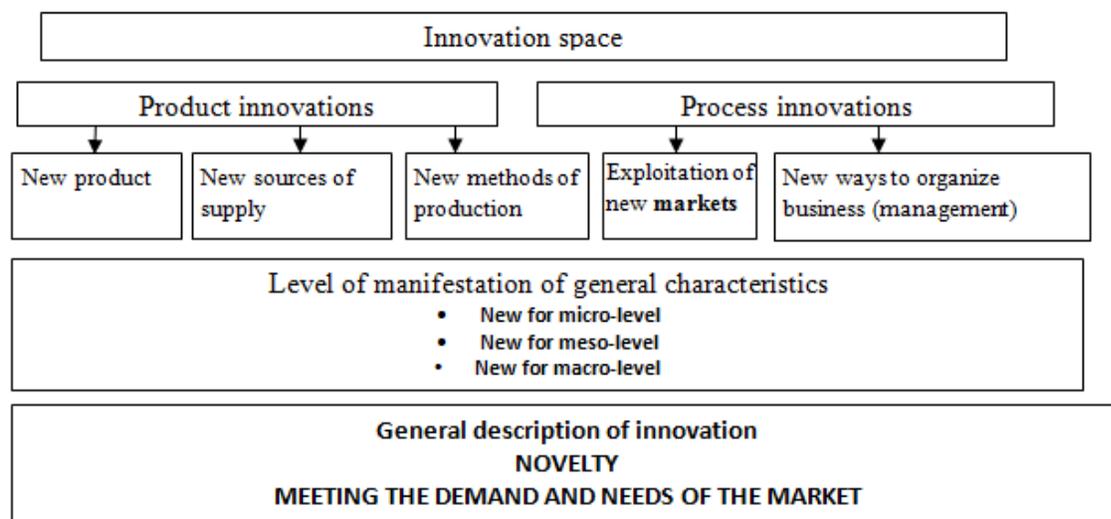


Figure 1. Innovation space

To bring order to the concept of innovation, foreign and Russian scientists developed various classifications (Schumpeter, 2007; Ilyenkova&Kuznetsov, 2009). Hardly all classification features are suitable for the education sector, but the main ones the type of innovations, the depth of introduced changes, continuity are fundamental (Romanova &Chernova, 2015).

The table below was compiled by the authors and outlines some specific features of introducing different types of innovations to the sphere of education:

Table 1. Innovation in Education

No	Innovation type	Description	Specific features of introducing to education
1	Material and technical innovations	Creating new materials, products, services and technologies, new ways of providing services and improving old ones	Using information technology while organizing an educational process
2	Economic innovations	The emergence of new markets as a result of newly introduced products or technologies, the emergence of new ways to buy and sell goods and economic processes resulting from the process of innovation	Attracting new categories of listeners. Implementing educational programs for people of "silver age"
3	Organizational and managerial innovations	New solutions and approaches in the process of managing or organizing the workflow of an organization	Using space and time to support learning processes, applying new forms of teaching
4	Social Innovations	New ideas and solutions intended to solve social and cultural problems of the society	Adapting educational programs to suit people with disabilities

Four basic innovations can be identified in the development of education as a system of knowledge:

1. The creation of the first universities in the Western Europe in the 10th-12th centuries which became special educational organizations whose activities were based on autonomy, leadership electivity and discussion as the basis for learning and a scientific activity. The creation of the first universities marked the beginning of the modern university system with its rights and privileges, including free choice of sciences, educational programs, the right to receive income and the recognition of a university degree by other universities. The university system is widespread even today, but the role of classical universities in our modern world is transforming significantly under the influence of rapid IT development among other factors, due to which the range of knowledge sources has expanded drastically, but it has not yet fully replaced the most important principle of university science and education, which is discussion.

2. The class-subject-lesson system created by Jan Amos Comenius in the 17th century, which determined the course of the development of school education for centuries ahead. The basis of this system is a clear organization of educational activities, where the main role is played by the teacher. The educational process is clearly structured within the system and constructed according to a single program in the framework of certain didactic elements. Despite a certain archaic nature, the Comenius system demonstrates a rare vitality, as it has reached our days almost unchanged, although it is already largely obsolete.

3. The appearance of research- universities according to the model of Wilhelm von Humboldt in the 19th century. The 19th century is the time when Europe entered a major modernization process and experienced a global industrialization, which required training a new type of personnel and, as a result, new forms and methods of education. Research universities acquired three new key advantages which made them advanced for their time: new forms of education, academic freedom and public funding.

4. The idea of pragmatism in education introduced by John Dewey in the 20th century and serving as a further basis for the development of project education.

As part of his idea, Dewey justified the idea of education via active inquiry about the surrounding world, since it was supposed to be the only way to evoke a desire for further self-education. From the pragmatic point of view, only the practical result and the real experience of independent problem solving have real value.

It is worth noting that all four innovations, despite a serious semantic difference, have safely survived to this day, although they have adjusted to the modern educational landscape in different ways. Here we have to admit that the modern world remains diverse and multifaceted, simultaneously embracing different educational ideas and even allowing the emergence of new ones, among which some have already matured:

- global competition for talent;
- growing democratization of education;
- growing demand for educational programs by older people (Konanchuk, 2017).

It is possible to trace the implementation of an innovative component in the educational process in the context of the main activities of educational organizations and the main management functions (Table 2).

**Table 2.** Implementing an innovative element through key management functions (compiled by the authors on the basis of research materials)

Management functions	Line of work of educational establishments		
	Education and disciplinary activity (core activity)	Scientific and research activity	Economic activity
Planning	Developing educational programs according to educational standards and requests of employers	Developing perspective courses of innovative activities in line with national priorities	Drawing up long-term plans to gain additional income
Organizing	Implementing educational courses aimed at achieving the necessary qualifications in a graduate	Creating laboratories, co-working centers, supporting student start-ups	Implementing further education programs, workshops
Motivating	Giving teachers and masters incentives to improve the quality of teaching	Increasing the dynamics of inventive and patent processes, encouraging inventions	Implementing the principles of an effective contract
Controlling	Implementing educational quality standards	Monitoring the use of intellectual activity results in educational and production processes	Funds allocation in economic activities

A successful activity of educational organizations which meets current demands largely depends on the management process aimed at achieving the set goals (Rudenko et al., 2015).

It is a must of our modern life to consider innovative processes in education. To this end, the Global Innovation Index (GII) is calculated, which characterizes the level of the creation as well as the use of innovations in various courses of the social and economic development of the society. The Global Innovation Index is calculated by Cornell SC Johnson College of Business in partnership with the Business School for the World INSEAD and the World Intellectual Property Organization. One of the components of this index is Human capital & research, which assesses the level of education development and applied innovative approaches. The Russian Federation ranked 45 out of 123 in this rating in 2017, while ranking 23rd by the Human Capital & Research (the level and standard of education and research in the country).

The Global Innovation Index 2015 report shows that linking entrepreneurship to scientific activities and the work of scientific institutions, attracting foreign subsidiaries and recruiting scientific personnel is often the most difficult assignment faced by countries. Positive secondary effects of innovation trigger a significant increase in the national economy and solve both economic development matters and social problems. According to Francis Gurry, the General Director of the World Intellectual Property Organization, innovations create extensive conditions for accelerating the economic growth of countries at all stages of development. However, these conditions are not created automatically. Each country should combine policy measures in such a way that will mobilize the existing innovative, creative and entrepreneurial potential of their economy.

## Results and Discussion

Let us take a closer look at each of the innovations against the backdrop of our time with a projection into the future.

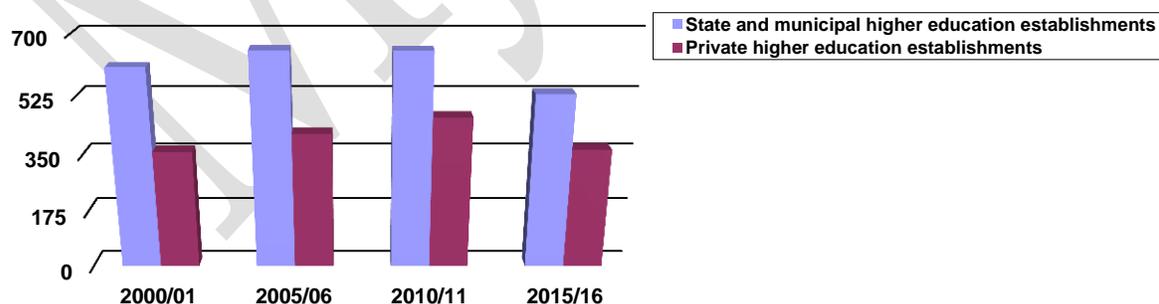
Universities of all countries participating in global processes compete for talented students using international ratings which were first published in the 00s and include the following best-known ones:

- Academic Ranking of World Universities (ARWU),
- World University, QS rating,
- The World University Ranking (THE WUR: Times Higher Education World University Rankings), etc.

According to the ratings, the criteria for assessing universities can be divided into three large groups: indicators of scientific activity; reputation and image of the university; the quality of education. The assessment of the scientific potential of a university depends on such indicators as the number of scientific articles written and published by university teachers in recognized foreign and Russian scientific journals, the number of citations of university professors, the volume of scientific research, etc. These and other ratings provide an opportunity to compare universities and make a choice based on a significant indicator.

The free choice of a university based on a rating initiated the process of reallocation of funds, which followed the informational positive. Not only students started choosing universities, but also teachers. University professors with the most significant professional portfolio choose more prestigious universities, because they can offer better conditions due to their resource base (Dzhandzhugazova et al., 2017). Such growing competition strengthens strong universities and weakens weak ones, letting more competitive educational institutions remain within the educational space. Many experts regard this fact as a deep crisis in the academic environment and even predict the complete disappearance of classical universities.

In fact, we are dealing with an ongoing structuring of the academic space, which is being transformed towards improving quality at the expense of excessive quantity. For example, the number of universities in Russia has decreased over the recent years; inefficient higher education establishments lose the state accreditation. The number of public and private organizations of higher education according to the State Statistics Committee of the Russian Federation is shown in Fig. 2.



**Figure 2.** Number of higher education establishments (at the beginning of the academic year)

At the beginning of 2015/16, the number of state higher education institutions decreased by 18.8 % compared to 2010/11, while private educational organizations decreased by 20.8%.

Undoubtedly, this process is painful and complex, many people, both in the educational community and outside it, perceive the growing competition as a catastrophe which destroys the educational environment developed in Russia and the foundations of social partnership (Valkovich, Asaliev&Vukovich, 2013).

We can say that we are experiencing a so-called ‘modernization stress’, which, unfortunately, accompanies all extensive reforms. It should be noted that both critics and proponents of education modernization give quite reasonable arguments to prove their point. The critics emphasize the growing inequality in the teaching and student environment, a strong tendency towards scientometric indicators used to evaluate the results of educational and scientific activity, the growing excess of organization in processes, etc. In their turn, the proponents emphasize the role of productivity, the need for the individualization of educational technologies and the provision of free choice of an educational trajectory for all students. In the end, all are right but in their own way, however, it should be taken into account that education changes along with the reality. It is absolutely clear that we cannot live in the 21st with the world view formed in the 19th century, because it simply does not work, which is why we need to move forward (Dzhandzhugazova, 2016).

In the last two decades, higher education has become fully accessible to the general population. For example, in developed countries, the share of people with higher education is about 40 %, and in countries such as Russia, Canada, South Korea and Japan it exceeds 55 %. Although we may observe the phenomenon of a steady growth of the educational level with every new generation, the intellectual level of generations, in fact, remains the same. This suggests the decline in the quality of higher education, both in the world and in Russia (Romanova, 2016). For example, the analysis of the research carried out by the Russian Public Opinion Research Center shows that 56 % of the population and 55 % of employers estimate the quality of Russian education as average. 21 % of employers consider it low (Table 3).

**Table 3.** Assessment of education quality in Russian higher education establishments

	What quality level does the education of graduates of Russian universities have today?	How would you rate the quality of your higher education which you had at a university?	What quality level does the education of graduates of Russian universities have today?
Close-end question, one reply, in % of all respondents			
Levels	All Russian population (18+)	Recent graduates	Employers
<i>High</i>	4	10	1
<i>Rather high</i>	18	48	12
<i>Average</i>	56	36	55
<i>Rather low</i>	13	3	21
<i>Low</i>	3	2	7
<i>Not sure</i>	6	1	4

More than a half of the Russians respondents (56 %) assess the quality of training in Russian universities as average, as do over a half of employers (55 %), and only a third recent graduates agree (36 %). 22 % of citizens believe that the level of training of graduates in Russian universities and institutes is high. This opinion is shared by most recent graduates (58 %) and only one out of ten employers agree (13 %). 16 % of Russians, a quarter of employers (28 %) and only 5 % of "yesterday's graduates" are confident that the training level of professional personnel is low.

The strive for higher education was brought to us by the time when it was a 'social elevator' and expressed something more than just the amount of knowledge gained. After all, receiving an education or, as they said then, "make your way in life" had the same meaning at the beginning of the 20th century, whereas in the 21st century, higher education became a like-everybody-else attribute, which immediately made it lose its importance both in the eyes of both students and employers. Modern education has become an ordinary phenomenon, and a university degree has ceased to be a sign of belonging with the professional and intellectual elite. In fact, education ceased to provide a profession, and, consequently, lost its value. The academic community was the first to notice this strange metamorphosis and tried to mitigate the situation by reflecting on the social significance of the learning process which structured the time of students. However, professional education is not a hobby club, and, therefore, it must be recognized that higher education is designed for a limited number of people who are capable of solving complex professional tasks.

Continuing the analysis of educational innovations, we cannot leave unnoticed the fact that in the future the educational process will encompass both young people and people of third age, i.e. pensioners. Such a change in the age vector is quite understandable, since the main category of students has been children and youth, whose share in the education system has been the overwhelming majority (up to 90 %). However, in the future the number of young people will decrease significantly. The world has already faced a large-scale problem of population aging. This tendency is particularly evident in countries with large populations (India, China), although many other predominantly European countries note this problem as well. In addition, the productive life of the population has been extended. This is especially observable in the number of working pensioners; some estimates evidence that their number in the world reaches 1 billion people. Traditionally, this category of people has rarely participated in educational programs, but life goals of people are changing, and the time when this part of the population will be actively interested in a variety of educational programs and, first of all, in further education is close at hand.

In Russia, 15 % of the working population and 1 % of pensioners participate in educational programs, which is 3 to 5 times less than the world average, the trend has already taken shape, and if we assume that the number of studying pensioners increases at least by a factor of two, new field of action will be opened for the Russian education system. Following the official statistics, Russia in 2017 has almost 42.7 million pensioners, 35.5 million of them are retired due to old age, of which 15 million are working.

Assuming that 2 % of working pensioners will study, this will make up 300 thousand people across the country. According to the public data, the largest university in Russia, Lomonosov Moscow State University, has about 60 thousand participants in all courses, which is almost 7 times less than the expected figure of pensioners who may be interested in training programs in the nearest future. At the same time, it should be noted that there will be no need to build new educational establishments in order to satisfy the needs of the older generation in education as the education system in the Russian Federation has been successfully developing for a long time.

Let us have a look at the rate of the growing need for educational programs based on the real number of retired people, taking as the example a few regions of the Russian Federation. According to the official statistics, almost a quarter of retired people live in 6 regions of the Russian Federation, the distribution of the number of pensioners in million people by regions is shown in Figure 3.



Figure 3. Distribution of pensioners in Russian regions (mln people).

Considering that around 30 % of retired people continue working, we may estimate an approximate potential number of people of third age who may be interested in various educational programs, including further education, provided that 5 % of working pensioners will become participants in educational programs (Table 4).

Table 4. Correlation of various retirement categories

Regions	Pensioners (mln people)	Working pensioners (mln people)	Studying pensioners (forecast, '000 people)	Number of students in the largest university of the region('000 people)	Ratio of the number of studying pensioners to the number of students in the local university (in %)
Moscow	2.7	0.81	40.5	60	67.5
Moscow region	1.9	0.57	27.5	11	250
Krasnodar krai	1.47	0.441	22.0	29	75.8
Rostov region	1.1	0.33	15.1	33	45.7
Tatarstan	1.1	0.33	15.1	45	335

Novosibirsk	0.8	0.24	12.0	7	170
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The figures in the table show that the number of pensioners in the aforementioned regions who can be involved in education is quite comparable or even several times greater than the number of young people studying at the largest university in the region. This fact emphasizes the extensive opportunities that the Russian education may have in the nearest future. However, we need to be prepared for this stage, because "andragogy", or adult education, differs significantly from the classical pedagogy and, undoubtedly, requires special approaches, forms and methods. In this regard, it is quite obvious that the increase in the number of older people will actually trigger the formation of a new type of economy where most of goods and services will be produced to ensure the socialization of pensioners.

Even today there are certain locations (districts and even cities) where the majority of residents are old. An interesting example of such location is Sun City, Palm Springs (California, USA), there are similar cities for pensioners in Japan and Western Europe. "Aging without the youth" is becoming a new trend of the modern society, which is a natural consequence of the current and future demographic situation. In Russia, the favorite place for older people to live in is small towns where life is cheaper and calmer than in large cities. In the center of Russia, the good prerequisites for the development of settlements and communities of pensioners are small historical cities that have valuable cultural and historical resources and draw the attention of wealthy pensioners from metropolitan cities.

A striking example demonstrating the trend is a small historical town of Tarusa (Kaluga region) with the permanent population of about 10 thousand residents, but even now its population increases by 10 to 15 times in some month, mainly because elderly people come from Moscow to live in Tarusa for at least 6 months a year. Over the past 10 years, the economy of this classical city of Russia has changed dramatically due to a significant increase in services, trade, tourism and recreation enterprises, although industrial and agricultural production decreased respectively, which was caused, among other reasons, by the diminished employable population. Beyond all doubt, this situation may be regarded differently: most mayors of small towns consider it as a negative situation and perceive an increase in the number of elderly residents of the city as a serious problem instead of opening new opportunities, creating a new social infrastructure for people of "silver age".

### Conclusion

In conclusion, it is noteworthy to say that innovations are a necessary condition for the development of the human society, and they are caused by profound civilizational processes. Accepting changes, people develop and improve themselves, but at the same time this complex development process contains the elements of the past, present and future (Dzhandzhugazova, 2017), and the ratio of these elements largely depends on the individual characteristics of people. In other words, progress and antiquity coexist in a human life; one must only find their useful balance. The market of educational services is innovative by nature because the volume of information augments every year and the need to receive new information actively prompt the use of the latest achievements in science and technology. Innovations in the education system are targeted changes designed to transform the educational system from one state into another.

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## Interdisciplinary Principle Of Students' Self-Development Competencies Forming In The Educational University Environment

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**Abstract:** In the course of continuous monitoring of the educational process with the help of monitoring tools, the effectiveness of the structure and content of cognitive, motivational and semantic and value-regulating components of forming the competencies of the student's self-development is substantiated, the importance of interdisciplinary principle in their design and implementation is established. The paper discloses the pedagogical conditions for designing and implementing the competences for self-development of the student's personality in the educational process of the university; the priorities of the interdisciplinary principle of self-development competences are established; based on the results of the study, cognitive, motivational-semantic and value-regulating components of the competences' structure and content of the student's self-development are grounded. The importance of the identified components was demonstrated with the help of the criteria of the student's readiness to participate in the realization of self-development competences; to transfer the competences of self-development to spheres and types of activity in the system of life goals, plans and programs; to focus on improving abilities; to form focus on professional growth; to have willingness for innovation. The materials of the paper can be useful for university teachers, methodologists, students.

**Keywords:** student's personality; educational process of the university; labor market needs; the competence of self-development; interdisciplinary principles; monitoring.

### Introduction

The solution of the problem of students' self-development - future competent specialists by definition is one of the priority social and pedagogical strategies of the educational process of a modern university. Interest in this issue is not accidental. It is conditioned by the fact that the need for specialists who are able independently and creatively to determine and solve various professional tasks taking into account their integration interaction, to generate and master innovative changes in science and industry in accordance with the sociocultural norms, the requirements of scientific and technological progress, established axiological benchmarks becomes a cultural imperative in the labor market. In his time, the Russian physiologist I.P. Pavlov (1973) noted that in the final analysis a person, becoming a subject of his own life and activity, independently determines his goals and directions of development, taking into account external circumstances and existing conditions. He believed that if people create all the necessary conditions for self-development, then "every person can become what he can and should become" (Pavlov, 1973). The relevance of this inference is not lost in our information age. In the course of the

research, a wide variety of the problem field of the student's personality self-development has been established, which in the theory and practice of pedagogical science is analyzed from the positions of various approaches: subjective, professionally - activities-based, personality - oriented, project - targeted, competence, synergetic, sociocultural, acme-logical, technological (Garanina, 2014; Zimnyaya, 2003; Ivanchenko, 2007; Kulikova, 2003; Lee, 2002; Maralov, 2017; Niemiec, Ryan & Deci, 2010; Post, 2009; Khutorskoy, 2003). Most experts prove the special importance of the competence approach in the modern student's self-development, proceeding from the deep essence of the concept's semantic content as a holistic self-developing system based on the activity-based transformation of the personality, generated by its needs for self-change with the help of self-development competencies aimed at the success of activity in the chosen profession (Abulkhanova - Slavskaya, 1991; Brandtstadter, 1998; Wellbery, 2009; Carver & Scheier, 2011; Kasavin, 2010; Knyazeva, 2007; Osmolovskaya & Krasnova, 2017; Popova, 2011; Slobodchikov, 2010; Stepin, 2007; Ulyanova, 2012; Shchukina, 2015). In this connection, in the course of the study, the structure and content of the competences priority components of the student's personality self-development in the educational process of the university are grounded: cognitive, motivational-semantic and value-regulative.

In the course of the study, it was proved that, in combination, the established components of self-development competences' formation fulfill multifunctional tasks of professional activity determination and regulation, the construction of the individual's self-development and self-control, are the basis for the development of the student's professional self-determination. It has been established that, despite the understanding of the significance of these priorities' formation reflected in the studies of recent years, their practical contribution to the process of forming the competencies for the student's self-development remains insufficiently studied in the educational process of the university (Azhimov, 2016; Brandtstädter, 1998; Garanina, 2014; Ivanchenko, 2007; Kasavin, 2010; Lee, 2002; Maralov, 2017).

The question of what are the pedagogical mechanisms that guide the university educational process to successful implementation of students' self-development competencies is also not clear enough, and what is the role of the interdisciplinary approach in this process (Brandtstadter, 1998; Lee, 2002; Maralov, 2017; Ulyanova, 2012; Khutorskoy, 2003; Shchukina, 2015).

The theoretical and methodical substantiation of the cognitive, motivational, semantic, value - regulating components of self-development competences' formation, which are conditioned by the interdisciplinary principle, deserves special attention on the part of researchers (Popova, 2011; Post, 2009). To solve this problem, the paper discloses the pedagogical conditions for designing and implementing the competences for self-development of the student's personality in the educational process of the university; the priorities of the interdisciplinary principle of self-development competences are established; on the basis of the research results, the cognitive, needed - motivational and value - regulating components of the student self-development competences' forming are substantiated. The importance of the identified components was demonstrated with the help of the criteria of the student's readiness to participate in the realization of self-development competences; transfer of self-development competence to spheres and activities in the system of life goals, plans and programs of the student; the focus on improving abilities and on professional and career growth, the need for innovation.

### Review of the Literature

Of particular importance for the study are the works of specialists which can be structured around the spheres of application: the philosophical approach (Knyazeva, 2007; Slobodchikov, 2010; Stepin, 2007); theoretical foundations of students' self-development in the educational process of the university (Brandtstadter, 1998, Wellbery, 2009; Carver & Scheier, 2011; Korostyleva, 2005; Kulikova, 2003; Nizovskikh, 2008; Oreshko, 2014; Orlov, 1991; Pavlov, 1973; Shchukina, 2015); an interdisciplinary approach to the formation of self-development competences (Azhimov, 2016; Zimnyaya, 2003; Kasavin,

2010; Lee, 2002; Niemiec, Ryan & Deci, 2010; Osmolovskaya & Krasnova, 2017; Popova, 2011; Post, 2009; Ulyanova, 2012; Khutorskoy, 2003); the concept of self-development in Humanities (Abulkhanova-Slavskaya, 1991; Ivanchenko, 2007; Maralov, 2017; Nikitin & Kharlamenkova, 2000).

It is established that in most of the works the results of the investigation of self-development determinants and procedural characteristics are presented: self-development as a form of self-regulation and self-development as a process of personal growth.

In the first direction, the emphasis is made on the activity of a person acting as a subject of activity, capable of determining strategies for changing one's own state and behavior. It is established that the personality is capable of its behavioral self-determination, which is carried out in accordance with the aspirations of the deep "I" (Garanina, 2014; Maralov, 2017). Three levels of self-regulation are substantiated in the processes of the individual's self-development: the first level is associated with self-changes at a particular time - "here and now", the second - with changes in individual personal qualities or patterns of behavior, the third - with changes in the personality as a whole, finding a new identity (Kulikova, 2003; Lee, 2002; Carver & Scheier, 2011).

In the second direction, self-development is seen as a person's ability to subjective growth, in the course of which he builds his own personality, forms his individuality. It is proved that personal growth is achieved through the creation of the individual's own development models, rather than through the orientation to the models proposed by the society (Brandtstadter, 1998; Wellbery, 2009; Maralov, 2017; Nizovskikh, 2008; Oreshko, 2014).

The established tendencies were realized in the course of the research as methodological grounds for designing the component composition of the self-development competencies' structure and content of the student's personality.

## Results

### 3.1. Pedagogical Conditions for Designing and Implementing the Competences of the Student's Self-Development in the Educational Process of the University

The research establishes the priority pedagogical conditions for the formation of competences for student self-development:

*- The first condition*

Innovation of the educational environment. The indexes of the university innovative educational environment, oriented on the use of the theoretical and methodical foundations of self - development competences' formation in educational practice are established: the scientific justification of the goals and tasks of the student's preparation; interdisciplinary principles of educational material's content selection and structuring; the availability of theoretical knowledge system, deepening the student's self-development, and practical skills that form the basis of self-development competences; development of interdisciplinary relations in the conjugate fields of professional activity; formation of interdisciplinary links of professional knowledge with other disciplines (technical, natural - scientific, social - humanitarian) and the system of professional knowledge as a single set; the allocation of the basic components in the content of training: the invariant part as a unit of new and promising technical facilities, production technologies for modern production (industry); the vocational part uniting professionally directed knowledge, selected in accordance with groups of professions; specialized, including concepts and theories, selected in accordance with the specialization of students; ideological part integrating on the interdisciplinary principles the social - humanitarian, vocational, specialized and practical cycles of disciplines that provide a sociocultural orientation of knowledge;

*- The second condition.* Interdisciplinary structure of knowledge is the basic core of self-development competences, purposeful self-change and self-improvement of the student's personality:

- at the level of goals - focus on the triune goals: strategic - personal and socio-professional self-development of the student's personality- the future specialist; operational - the development of knowledge, abilities, skills, qualities, experience, significant for the formation of competencies for self-development; prognostic - self-development of the creative potential of the future specialist's personality, formation of an attitude towards social and professional growth, career, readiness for innovation;

- at the content level - the focus on the organized form of interaction of competencies' all components; agreeing on the objectives of the activity; self-organization of actions of the student and teacher in the educational process; heuristic hypothesis-analogy, transferring the construction of one component of competence in another to construct a new meaning and new goals of self-development;

- At the procedural level - orientation on the modification of the relationship of the teacher and student; expansion of partnership, cooperation and mutual assistance;

- At the level of means - the focus on the use of innovative information technologies (modular, project, computer, network, digital);

- At the level of educational results - the student's readiness for self-development in creative activity;

- At the level of conditions - a collective creative environment in the educational process that generates and reinforces the creative behavior of the individual, aimed at its self-development

- at the level of criteria for the formation of competences - the availability of knowledge and skills in handling competencies; content and development of value orientations and social norms, which are the standard in various spheres of activity; the formation of professional ideals; degree of involvement in educational, cognitive and socio-professional activities;

- *The third condition.* Pedagogical mechanisms (Garanina, 2014; Maralov, 2017; Nizovskikh, 2008), which determine students' preferences in the choice of competences for self-development:

- Mechanisms of possession. They mean that a person wants to master what it did not have before, such qualities, abilities or behaviors that, from the standpoint of the individual, and most importantly, from the positions of others, are the reference ones;

- The mechanisms of transformation. They are applied when the personality qualitatively changes or transforms its needs, qualities.

Different variants are supposed here: perfection of their own, already existing properties, or their transformation into another quality. For example, uncertainty is transformed into confidence, quick temper - into restraint, indecision in responsibility, etc.;

- Correction mechanisms. The meaning of using these mechanisms is that the student wants to get rid of unwanted behavioral reactions or some other negative personal qualities. For example, get rid of bad habits and propensities, slowness, uncertainty, indecisiveness, shyness, etc.;

- Restriction mechanisms. They do not presume to get rid of negative properties or qualities, but to limit their actions. In cases where a student cannot immediately quit smoking, he can limit the number of cigarettes smoked; if he believes that he is indecisive, he can limit his indecisiveness by making a responsible decision.

It is determined that the special preferences of the first year students are expressed in relation to the mechanisms of possession and restriction. On the 3rd course, the situation changes toward transformation and correction.

### 3.2. Priorities of Interdisciplinary Principle

During the research, five phenomenological types of interdisciplinary side were established (Knyazeva, 2007; Stepin, 2007), which determine the content of the same name principle:

- Interdisciplinary side as the coordination of adjacent disciplines' concepts. It is intended to construct a common content base for the adjacent discipline, where each discipline uses its thesaurus.

An example is interdisciplinary courses in physical chemistry, biochemistry, sociology and psychology;

- interdisciplinary side as trans- cognition of not closely related disciplines' concepts on the basis of interconnection of general scientific, invariant, universal methods of system analysis and synergy. This type of interdisciplinary side is used by a wide variety of disciplines;

- Interdisciplinary side as a heuristic hypothesis - an analogy that transfers the constructions of one discipline to another at first without sufficient justification. The incompleteness and creativity of such hypothetical transfers necessitates either their justification within the framework of this discipline or a revision of the grounds;

- Interdisciplinary side as a constructive interdisciplinary project, an organized form of interaction of many disciplines for understanding, substantiating and managing the phenomena of super complex systems;

- Interdisciplinary side as a network communication or self-organization of communication.

On the basis of network communication, interdisciplinary methodology, trans- disciplinary norms and values, invariants and universals of the scientific picture of the world are implemented, the system analysis is developed. The essence of the interdisciplinary principle as a pedagogical system is determined, the main purpose of which is the communication or self-organization of communication between a student and a teacher, a student and the educational process, a student and a student in the process of forming the competences of student self-organization. Due to communication, interdisciplinary methodology is being implemented in the process of forming competencies for self-organization (Knyazeva, 2007; Stepin, 2007; Ulyanova, 2012; Khutorskoy, 2003) as:

- Coordination of related disciplines' concepts;

- trans-harmony of concepts not closely related disciplines on the basis of interconnection of general scientific, invariant, universal methods of system analysis and synergy;

- A heuristic hypothesis - an analogy that transfers the construction of one discipline to another;

- Constructive interdisciplinary project, organized form of many disciplines' interaction;

- As a network communication or self-organization of communication.

The study found that the identified components of interdisciplinary side in terms of their semantic content correspond to the current trends in the transformation of the educational process of higher education and confirm their importance for the design and implementation of the interdisciplinary principle in the process of forming the competencies for the self-development of a university student. In this connection, the structure and content of the algorithm for designing the interdisciplinary principle as an integrated pedagogical system, the organized form of educational disciplines' interaction for understanding, justifying and managing the process of forming the competences of student self-development are substantiated. The algorithm provides an approximate sequence of actions:

- Definition of a problem that is significant for the formation of competences for the self-development of students, which requires integrated knowledge, research search for its solution;

- Formulation of the activity objectives (strategic, operational, prognostic), focused on the design and implementation of the competences for self-development of the student's personality;
- Promotion of hypotheses for the solution of goals;
- Stage-by-stage structuring of the substantive part of the interdisciplinary principle (cognitive, motivational - semantic, value- regulating components), representing a completed unit of educational material, supplemented by methodical developments, an innovative system of knowledge control and correction of the process of forming competences;
- Projects of independent (individual, pair, and group) activities of students;
- Ways to formalize the interdisciplinary principle (coordination, trans- harmonization, heuristic hypothesis - analogy, constructive project or network communication).

### 3.3. Interdisciplinary Nature of Student Self-Development Competences

In the course of the study, the main goal of the established methodology for the implementation of the interdisciplinary principle as a pedagogical system oriented towards the formation of competences for self-development is substantiated:

- 1) Knowledge, skills:
  - in the solution of complex integrated tasks based on interdisciplinary integration;
  - in the creative transfer of concepts, ideas and methods of activity from one practice or field of knowledge to another;
  - in understanding the place and role of the profession as part of larger systems and society as a whole;
  - In the formation of a flexible structure of value orientations, the development of over professional ethical principles, reflection on professional activity from the position of harmonizing it with universal values;
- 2) Abilities:
  - To the creation of integrated knowledge based on the harmonization of related disciplines or trans-harmonization of non-closely related disciplines;
  - to the solution of interdisciplinary tasks by methods of various disciplines;
  - to module training, focused on the interdisciplinary nature of self-development models of the individual;
  - to design and implementation of interactive modular technologies;
- 3) Personal qualities:
  - awareness of oneself, one's "self";
  - awareness of their professional and personal qualities;
  - self-cognition;
  - Social and personal self-estimation;
  - self-regulation (professional self-improvement) on the basis of self-cognition and self-estimation;
- 4) experience of behavior and activity:
  - in development and self-education by mastering technologies and methods of assimilating modern volumes of information, improving universal methods of cognition and mental activity;

- in the coordination of curricula content of various disciplines on the basis of the conceptual apparatus' commonality;

- in the design and implementation of research projects, master classes on interdisciplinary topics.

In the course of the study, the component composition of the integral structure of self-development competencies of the student's personality is grounded:

- Cognitive component: the availability of knowledge about their professional activities, one's own perceptions about self in the context of this activity; the image "I am a professional" is integrated with the "self-concept";

- Motivational and semantic component: stable cognitive needs and interests; sense-forming motivation; semantic empathy; semantic identification; motives of self-actualization;

- Value-regulating component: self-actualization; cognitive activity; positive self - concept that serves as a source of sustainable adequate self-estimation; adequate self-evaluation; aspiration for personal and professional self-development; self-correction.

In the course of the study it was proved that, in combination, the components of the developed structure of self-development competencies serve to determine and regulate professional activity, design, self-development and self-control of the individual, acting as the basis for the development of professional self-determination of the individual. In this connection, the criteria confirming the importance of the component composition of self-development competences acquire special relevance. Competences' composition was tested in the student groups of the 1-3-year courses. The obtained results confirm the preference of students' choice of cognitive components for self-development competencies (the importance of components in the groups of students of the 1st course increased by 11%, the 3rd course by 13.5%). A lower level of attitude towards the motivational and semantic component was noted (stable cognitive needs and interests - the importance of components grew by 8.5% on the 1st year, by 9.9% on the third year; meaningful motivation - on the 1st year the increase was 5.5%, in the third year - 6.0%; and semantic empathy - the importance of competencies increased by 3, 0% in the first year, by 5.0% in the third year; semantic identification - on the 1st course - 1.5%, on the third year - 2.0%, motives for self-development - on the first course the significance increased by 1.5%, on the third year - by 2.0%). The value-regulating component, in comparison with the motivational-semantic and cognitive, is characterized by a higher level of relation to the component composition of self-development competencies (self-actualization - the importance of components in the first year increased by 6.5%, in the third year by 7.5% , cognitive activity - on the first course, the significance increased by 7.5%, on the third year - by 11.0%, the positive I - the concept, which serves as a source of stable adequate self-esteem - on the 1 st course, the significance increased by 12, 0%, in the third year - by 15%, the desire for personal and professional self-development - the importance of components increased by 15.0% on the 1-st, by 23.0%, on the 3-d course, the importance of components increased by 20.0% in the 1-st, in the third year - by 35.0%). The established stability of a high level of preferences in the cognitive and value - regulating components of self - development competences is explained by the stereotypes of the traditional system of education that gives preference to knowledge and value bases in the process of students' training, that cannot be said about the state of motivational and semantic components most often influenced by the students' differing maturity of approaches. It is determined that the higher the interdisciplinary level of the component composition of the student's self-development competences, the more meaningful, productive and higher his responsibility for all possible achievements in self-development and in the realization of goals, values and meanings that have, in addition to personal preferences public recognition. Students with a high level of interdisciplinary component composition of self-development competences are more eager to learn and develop themselves, their abilities and skills. In accordance with this, they realize their needs in the education they receive as a way of self-realization and identity.

It is proved that this group of students has a clearer expression of the desire to use various components (cognitive, motivational - semantic, value - regulative) of self - development competencies.

### Conclusion

The conducted research confirms the theoretical and practical importance of the problem of forming self-development competencies that provide the process of training a student - the future specialist of a new generation in the innovative educational process of the university. The theoretical and methodical approach to the design of the component composition of self-development competences presented in the study is of interest not only for determining the conceptual directions for updating the educational process of the university, but also for solving practically important issues, such as determining the content of self-development competences, delimiting this concept with other concepts of "self". Therefore, attempts to develop the component composition of self-development competences (cognitive, motivational, semantic, and value-regulative) on the basis of the interdisciplinary principle, undertaken in this study, make sense for the theory and practice of the educational process of the university. The realization of the component composition of self-development competences also allows solving an equally important task of the educational process of the university - the definition of the pedagogical mechanisms for designing the competencies of self-development in educational activities in accordance with the preferences of students based on their personal characteristics. In this regard, this paper presents a justification for the model pedagogical mechanisms established in the course of the study, which determine students' preferences in the choice of competences for self-development (possession, transformation, correction, restriction). The paper discloses the pedagogical conditions for designing and implementing the competences for self-development of the student's personality in the educational process of the university; the priorities of the interdisciplinary principle of self-development competences are established; based on the results of the study, cognitive, motivational - semantic and value - regulating components of competences' structure and content for student self - development are substantiated. The importance of the identified components was demonstrated with the help of the student's readiness criteria to participate in the realization of self-development competences; to transfer the competences of self-development to the spheres and types of students' activities in the system of life goals, plans and programs; focus on improving abilities; formation of the attitude for professional growth; readiness for innovation.

By solving the tasks of the conducted research, the study of the problems caused by the aspects of competences' formation for the self-development of students is not being completed.

The scientific and methodical provision of forming competences' process, the creation of interdisciplinary textbooks, electronic manuals, trainings, frames and other options are of particular interest for future researchers.

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## Source Of Consolidation Of Individuals In A Civil Socie-Ty: From Production To Communication

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**Abstract:** The authors study difference specific of the ideas of classics of Marxism and Y. Khabermas, related to understanding the sources of social integration in civil society, explain the reasons of permanent interest to production of such ideas, and show that in the process of specific historical change of the structure of civil society the corresponding methods of its self-organization form, which become an object of socio-philosophical reflection.

**Keywords:** civil society, "free humanity", communicative rationality, communicative action, "language game".

### Introduction

The term "civil society" was introduced in the 16th century in the commentary to the Aristotle's "Politic" for denoting the society which is not governed by the laws created by professional politicians. In the modern age, an idea that "civil society" was formed only in the modern world dominates (Hegel, 1990) - which was supported by classics of Marxism. They viewed "civil society" as a non-state organization of bourgeois society which destroyed its political character and was freed from the medieval form of property (Lubsky et al., 2016).

At present, there's no agreement in treatment of the essence of "civil society", though the main sign of "civil society", announced by Karl Marx, which consists in its independence from political state, is generally acknowledged. Thus, E. Hellner (2004) defines civil society as "totality of non-government institutes which are sufficiently strong to be an opposition to the state and hinder its suppressing other society" E. Hellner (2004) and Y. Khabermas (2001, 2003), speaking of "autonomous social groups", writes that they "emerge naturally in micro-spheres of everyday practice, not created by the political system".

The works of classics of Marxism contain a wider understanding of civil society, as "natural basis" of the state and other idealistic construction (Sagatovsky, 2005).

In this article, the notion "civil society" is used regardless of political state.

New European civil society was started by the bourgeois revolution, which included struggle of Jews for "free humanity". According to K. Marx and F. Engels, in a class-divided society "free humanity means recognition of egoistic civil individual as an independent human, connected to another human only by

the ties of personal interest and unconscious natural need", a slave of own and another's "self-seeking need" (Marx & Engels, 1955). Freeing human from the ties of class-divided society and personal dependence and providing him with freedom of entrepreneurship, the bourgeoisie puts human into a new dependence - material dependence. That's why "free humanity" is only "seemingly the greatest freedom", but it is freedom related to "unconstrained human, moved by alien elements"; it is only slavery, which is an opposition to humanity. Thus, "freedom of property" in the society of "free humanity" provides an egoistic individual with freedom of entrepreneurship, based on the search for profit (Marx & Engels, 1955). Freedom is seen in the civil society because "privilege is replaced by law" (Marx & Engels, 1955). But neither of the rights "goes beyond egoistic human", who is citizen who represents "an individual who is in himself and his personal interest and is separated from the public whole" (Marx & Engels, 1955). Agreeing with G.V. Hegel (1990) that civil society is the sphere of "egoism with bellum omnium contra omnes" ("war against everyone"), K. Marx and F. Engels emphasized that this society is peculiar for "division", "filth", and "slavery".

Civil society was negatively characterized by a lot of Russian religious philosophers. N. Fedorov (2003) wrote that "The public is spiritless. It has internal disease - enmity and open war. A citizen desires for public life which includes party, class, and other struggle and fighting. The public does not have anything common. Only brotherhood has something common".

### Materials and Methods

While civil society is peculiar for "bellum omnium contra omnes", why does this society exist and why is it characterized by social integration? Using the theoretical and methodological principles of the dialectic and materialistic un-derstanding of history, developed by the classics of Marxism, the authors have reconstructed their explanation of the possibility for integration of individuals of civil society who are at war.

Thus, the main goal of social critic, which constitutes the essence of the works of Karl Marx, was "State and money" (Rubel, 2006), and he did not accept the idea of T. Hobbes, according to which the state of society as "war against everyone" could be pacified by the external influence of state-Leviathan. Acknowledging the correctness of comparison of state and Leviathan<sup>1</sup> (Marx & Engels, 1955), Karl Marx stated that restraining power could be ascribed to state only if members of civil society are atoms without any internal connection. But, from the point of view of Karl Marx, individuals in civil society are not atoms due to the fact that each action and each desire becomes "need". A paradox appear: individuals of the civil society, being at war, have to establish connections between each other, for they have to satisfy their material needs - as a result, egoism turns into the need for each other. The need of one egoistic individual does not bear for another individual who possesses the means for satisfying this need no sense, as it has no direct connection to satisfaction of the need. This makes each individual become "a tie between another's need and objects of this need". That's why "natural need and personal interest, preserva-tion of own property and egoistic personality" are the only connection that unifies the members of civil society (Marx & Engels, 1955). In other words, civil, not political, life is the real connection between them" (Marx & Engels, 1955).

That is the state of things in a bourgeois civil society. Proletarian civil society seeks the goal to eliminate the domination of egoistic individuals; for that, according to V.I. Lenin, (1975) there's necessity for proletarian democracy as a special form of state. The historical mission of proletarian democracy consists

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<sup>1</sup> The essence of state-Leviathan was pointed out by Karl Marx by the example of the French state of mid-19th century "The executive power with its huge bureaucratic and military organization, multi-level and artificial state machine, a host of officials and half a million people with half a million soldiers, this large parasite which has its web around the French society and plucks all its ways out ..."

in creation of classless civil society in which egoistic interests of individuals will be subject to one common goal – creation of communism. Such society should be based on people’s self-administration, which has no political measure, so any struggle for political liberties, human rights, the right for meetings and strikes will not be topical. As a result, the society based on self-management will have no need for militia, bureaucracy, etc. A society, in which people will be unified by the common goal of life and labor, not by necessity for satisfying their egoistic materials needs, will be formed. According to V.I. Lenin (1975), such society is a true civil society, formation of which will lead to disappearance of proletarian democracy, i.e., disappearance of the state.

### Results

In early 20th century an idea appeared that the sources of social integration, offered by classics of Marxism, disappear. The principle of priority of material or ideal activities, as guarantors of social integration, stops working. In the search for other ties of social integration, theoretical and methodological principles of symbolic interactionism were in demand – in which the basis of analysis of socio-cultural reality was social interactions in their symbolic, primarily language, expression. An active search for connection between social science and hermeneutics began.

The authors of the article consider language as a semantic horizon, built in the structure of everyday communications, which ensures mutual understanding, and use, according to Y. Khabermas (2001, 2003, 2007), the notion “living world”, but not in the hermeneutic sense but from the point of view of communication theory in which it is seen as a certain communication resource that creates inter-subject context of communicative action and mutual understanding.

The program of new approaches to analysis of social integration was formulated by Y. Khabermas (2003, 2007) in the following way, “Social and integration power in the scale of social integration should overcome such systemic and integration managing environments as finances and power”. From his point of view, resources of social integration and formation of social groups should be sought in mutual understanding and agreement between the subjects (Khabermas, 2001.). M. Heidegger supported the same position, “Coming to an agreement means thinking in the same way; when opinions differ, stating the position based in which agreement and disagreement are equal... As misunderstanding and lack of understanding are only queers of agreement, it should substantiate people’s coming to each other in their independence” (Rubel, 2006).

Orientation at mutual understanding, as the basis of social solidarity, led to hermeneutic methodology of social and humanitarian sciences, used, according to Y. Khabermas (2007), in pragmatism of C. Pearce and J. Mead, linguistic philosophy of L. Wittgenstein (1994) and J. Austin, and philosophical hermeneutics of Hans-Georg Gadamer (Khabermas, 2007). Solution of the problem of agreement between the people was viewed as a resource to their unification. The ties of the modern civil society were considered to be communication<sup>2</sup> (Khabermas, 2001), not the process of production or serving the common idea. The notion of communicative action, introduced by Y. Khabermas (2007), meant the actions oriented at mutual understanding of acting individuals, their consensus and sought the aim of explaining how and why sociality is strengthened not by instrumental action, oriented at success, not by the goals of the leading class, not by the will of the majority, not by the common idea, but by social senses, created by communicative mind in communicative actions (Khabermas, 2007).

### Discussion

It should be noted that preconditions of formation of the ideas of communicative actions were set by

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<sup>2</sup> Y. Khabermas (2007) saw communication as speaking when we “say something to someone else, so that another person understands what is said”. Speaking of the state of things does not mean participating in certain communication”

representatives of analytical philosophy (Wittgenstein, 1994), linguists (Ferdinand de Saussure, etc.), and semioticians. Thus, L. Wittgenstein (1994) developed the theory of "language games" as an inseparable component of socio-cultural interaction and wrote that "The term "language game" should emphasize that speaking a language is a component of activities or a form of life" (Wittgenstein, 1994).

It is known that the desire of L. Wittgenstein (1994) to formalize in the "language games" the basic unities "thoughts - words - actions" was not successful. Despite this, he started consideration of communication as "embodied sociality", though this notion was not invented by him. The idea of language as "embodied sociality" was supported by post-modernists. Thus, Jean-François Lyotard stated that "social connections consist of language "turns" and "language games are minimum relations for existence of society". Any human, regardless of his wealth, sex, or age, always finds himself in the communication point through which a lot of various messages come. These "points" are the place of formation of non-class and politics-free social senses which predetermine the possibility of social commonness.

It is known that the concept of "language games" was built on the idea that language creates inter-subject senses as certain artifacts and that the literal meaning of the phrase determines all conditions of the effective power of a speech act, so communicative participation in the living world, presented by the language picture of the world, requires only analysis of language. Language was proclaimed "firm soil" on which "I could meet Another, agreeing to something".

Such position was criticized by a lot of philosophers, in particular by John Rogers Searle, whom Y. Khabermas (2007) quoted, "Even thoroughly analyzed offers are effective as to the common for participants of communication of background knowledge, which is constituent for the world in which this language society exists" (Khabermas, 2007). In other words, mutual understanding of participants of communication may take place only if the participants possess certain pre-reflexive background ideas with holistic nature. This means that language games were not the initial basic material of statements and functioned only so much as they envisaged certain preconditions as a necessary condition of possible understanding and mutual understanding (Khabermas, 2007). Overcoming the monological foundations of philosophy of consciousness or philosophy of subject, Y. Khabermas (2007) combined the ideas of language games as "embodied sociality" and the idea of "living world", which possesses the function of formation of context of communicative action, being a resource for the mutual understanding processes. Such combination of the ideas made an end to hypostatization of the educating power of language and the ideas that language sheds light on everything that exists in this world. The idea that language cannot become an enlightening power that sheds light on everything that exists in this world came to L. Wittgenstein (1994) who wrote, "When it is impossible to speak of something, it is necessary to stay silent" (Philosophy of science, 2005). Y. Khabermas (2007) called this statement of L. Wittgenstein (1994) a retreat to "silent observation of a mystic".

Remaining a follower of the rationalistic idea of the value of the mind in culture, Y. Khabermas (2007) introduced the notion of communicative mind, which, unlike the scientific mind, focuses his efforts not on cognition but on search for compromises and mutual understanding, which are a condition of establishment of non-violent methods of social being. Therefore, restoration of the social component in the social sphere. Hence the attention of Y. Khabermas (2007) to free dialog between everyone as a sole means of establishment of agreement and peace in society. The dialog participants are based not on certain common values and norms but on individual and personal perspective, related to care for each "Self" and own living activities, which leads to restoration of the life component in the social sphere. A question arises: how do these individual and personal perspectives coordinate? According to Y. Khabermas (2007) achievement of peace and agreement requires from participants of the communication

action to coordinate their intentions and accept mutual liabilities which perform the role of moral debt<sup>3</sup>. In this case, persons and groups of people who enter communication have a possibility to express their interests and needs and introduce amendments into the acts of self-expression, which take into account desires and wishes of other people.

### Conclusions

Liberal philosophers think that communicative dialog, as a sphere of openness, determines the vector of social development, aimed for agreement and peace. However, the practice of dialog discussion of the sphere of Public Relations (Khabermas, 2001) of actual economic, political, social, and cultural problems shows that its participants never come to an agreement. Thus, public and communicative & behavioral discussions on Russian TV are beyond the context of mutual agreements and responsibility, increasing the level of mutual enmity and disagreement. Of course, there appears a desire to proclaim the project of achievement of agreement and peace in civil society a form of liberal utopia. By the way, Y. Khabermas (2003, 2007) thought that the idea of communicative action, which ensures agreement in society, requires communicative wisdom from all its citizens, which is very difficult to achieve in the near future.

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<sup>3</sup> Moral debt in his understanding loses a metaphysical measure of a certain categorical imperative and acquires purely practical sense

Tastan, S.B., & Davoudi, S.M.M. (2015). An empirical research on the examination of the relationship between perceived workplace incivility and job involvement: the moderating role of collaborative climate. *International Journal of Work Organisation and Emotion*, Inderscience Publishers, 2015, 7(1): 35-62.

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WITTGENSTEIN

## Analog Sound Signals Digitalization And Processing

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**Abstract:** The article is devoted to the basics of analog signals digitalization and further processing of obtained digital discrete signals. Analog-to-digital conversion was analyzed, considering the constraints imposed by computers, as they are unable to work with infinite data. In the course of the article, the problems, arising through the signal discretization, were learnt as well as their solutions. The need of discrete signals transform from time domain to frequency domain was identified. The flaws of existing methods and the ways of their minimization were investigated, in order to get the capability of acquiring the signal that can be analyzed, processed and restored to analog form. The relevance of the article is confirmed by the amount of researches on adjacent themes, in great amount of human activity spheres, as: medicine, geo-, echo-, radiolocation, music and etc.

**Keywords:** digitalization and signal processing; Fourier transform; filtration; application of window functions; linear systems.

### Introduction

Digitization of analog signals includes the following basic operations: sampling, quantization, coding. Discretization is the crushing of a continuous signal in time. The time interval is called the sampling interval. The reciprocal of the interval between fractions is called the sampling frequency. Accuracy of digitization by sampling depends on the frequency of crushing. The higher the sampling frequency, the fewer differences between the analog signal and its discrete copy. Quantization is a substitution of the value of the signal reading by the nearest values from a set of fixed quantities, quantization levels. Quantization is the rounding of the count. The quantization levels divide the range of possible changes in signal values by a finite number by an interval - quantization steps. Digital coding can only be used if the quantum signal has a finite number of values. Digital encoding operations are performed by analog-to-digital converters (integrated circuits). In world practice, there are many ways of coding signals, including multi-component video signals, composite signals using PAL and NTSC systems, which are sampled at 4fsc, etc. The research proposes a modern method of digitizing an analog signal and the subsequent processing of a discrete copy of the audio signal. During the work on the digitization of sound, shortcomings and computer limitations were revealed. A variant of the transformation from the

time domain into the frequency domain is considered. When processing and digitizing the signal, mathematical and information methods for minimizing distortions are proposed. The method of digitization proposed by the authors has practical significance. The results of approbation give a higher quality of digitizing the signal. Further, a more detailed description.

### Materials and Methods

The physical properties of sound from a physical point of view, sound is a wave caused by vibration of a body, e.g., strings. Important for analyzing the sound parameters are: pitch, volume and timbre. Example of sound waves and overtones is presented in figure 1.

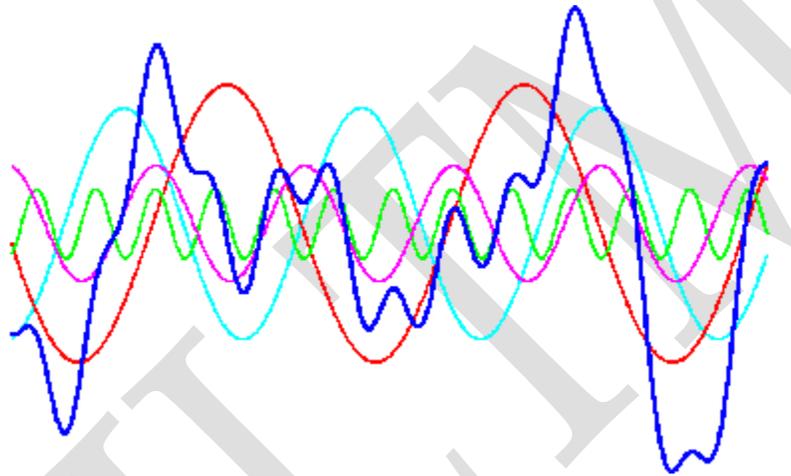


Figure 1. Sound waves and overtones

The height of audible sound is the frequency of the sound wave, the higher it is, the higher the perceived sound. For the loudness of sound and amplitude of the wave, the greater the amplitude, the louder the sound. Timbre is the property that allows us to distinguish the same height and volume of the sounds. The timbre is defined by overtones, which appear due to the acoustic properties of the environment and of the body that makes a sound (Pozdnyakova & Soldatov, 2017; Sergeyev, 2011; Shmakova, 2013; Soldatov, 2017).

### Results and Discussions

#### Digital Audio Recording

When recording, sound waves vibrate the microphone's membrane, which converts them into analogous oscillations of the electric current. This signal is fed to an analog-to-digital converter (ADC), which digitizes the original analog signal with a specified sampling rate. The analog signal is mathematically composed of a continuous infinite number of points - the amplitude values, during the measurement it is possible to isolate only a finite number of values at discrete instants of time, i.e. time quantization is performed, the number of quantization levels is also called the sampling depth, which is expressed in bits. The sampling frequency is the sampling frequency, measured in hertz. The greater the sampling depth and the higher the sampling rate, the more accurate the digital signal corresponds to the analogue.

According to the Kotel'nikov-Nyquist-Shannon theorem, an analog periodic signal having a finite spectrum can be uniquely reconstructed without distortion and loss from its readings taken at a frequency greater than or equal to twice the upper frequency of the spectrum, called the sampling frequency. For example, a guitar has a frequency range from 82 Hz to 1175 Hz and an overtone of up to 12 kHz, in order to get the original sound of the instrument on record, it is necessary to record at a sampling frequency of 24 kHz. However, the application of this theorem does not guarantee the absence of distortion. For example, when recording a guitar processor created interference at a frequency of 19 kHz. In this case, at the right sampling frequency, the aliasing effect will occur, i.e. The interference will be reflected in the lower part of the spectrum - approximately at a frequency of 5 kHz. Figure 2 shows the aliasing effect. The blue line is a discrete signal, the red line is an interference that is above half the sampling frequency, reflected on the lower part of the spectrum.

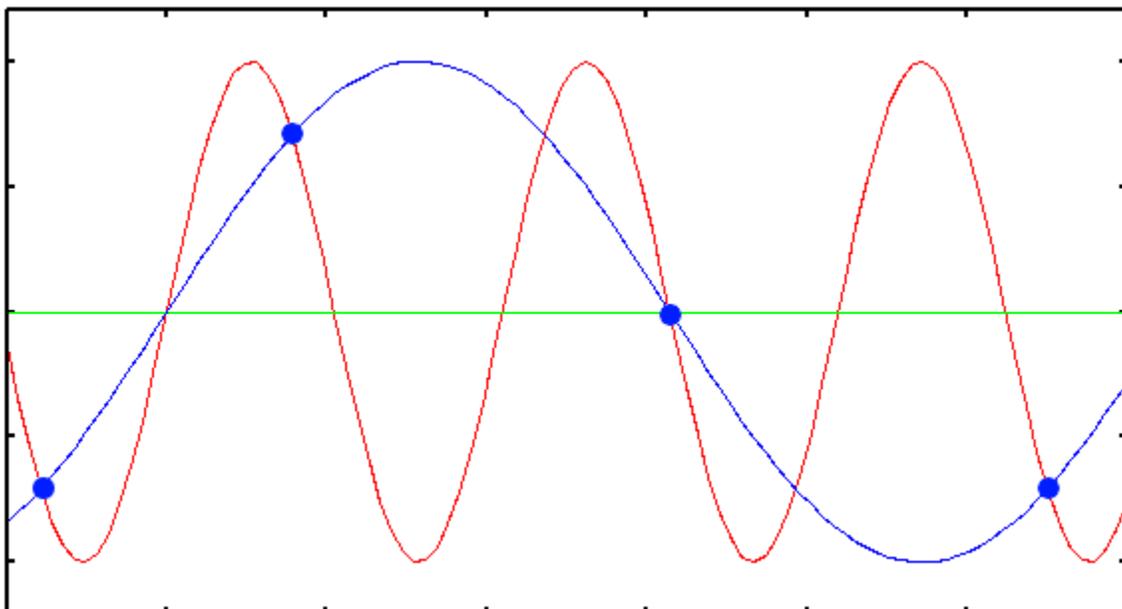


Figure 2. The aliasing effect

In order to avoid the aliasing effect, it is possible to increase the sampling frequency so that the entire spectrum of the signal fits below half the sampling frequency. However, this approach will greatly increase the amount of recorded data, and besides it is impossible to predict at what frequency there will be interference. Therefore, the second method is preferable: the use of low-frequency and high-frequency filters. However, to work with them, we need to get the frequency spectrum of the signal.

### Processing of the Audio Signal

To obtain the frequency spectrum, the Fourier transform is used. The Fourier Transform is an operation that associates the original function with a real variable of another such function. The new function describes the amplitudes of the elementary components of the original function - harmonic oscillations with different frequencies. Those. in the case of signal processing, the Fourier transform takes the representation of the signal function in the form of time series and maps it to the frequency spectrum, this method is called discrete Fourier transform (DFT). In the classical form, the DFT can be written as on the formula 1:

$$F(k) = \sum_{n=0}^{N-1} f(n) * e^{-j * \frac{2 * \pi * n * k}{N}}, k = 0, \dots, N - 1, \tag{1}$$

Where:

N - the number of signal values measured over a period, as well as the frequency spectrum multiplicity.

A direct DFT can be represented in terms of the real and imaginary components, formulas 2 and 3:

$$Re(F(k)) = \sum_{n=0}^{N-1} f(n) * \cos\left(\frac{2 * \pi * n * k}{N}\right), k = 0, \dots, N - 1 \tag{2}$$

$$Im(F(k)) = -\sum_{n=0}^{N-1} f(n) * \sin\left(\frac{2 * \pi * n * k}{N}\right), k = 0, \dots, N - 1 \tag{3}$$

As you can see from these formulas, the transformation decomposes the signal into sinusoidal components - harmonics. A feature of the DFT is that a discrete sequence can be obtained by a sum of functions with different composition of harmonics, i.e. the decomposition is ambiguous. Because of this, high-frequency components appear in the second half of the spectrum, which are a mirror image of the first part. Figure 3 illustrates the mirror effect:

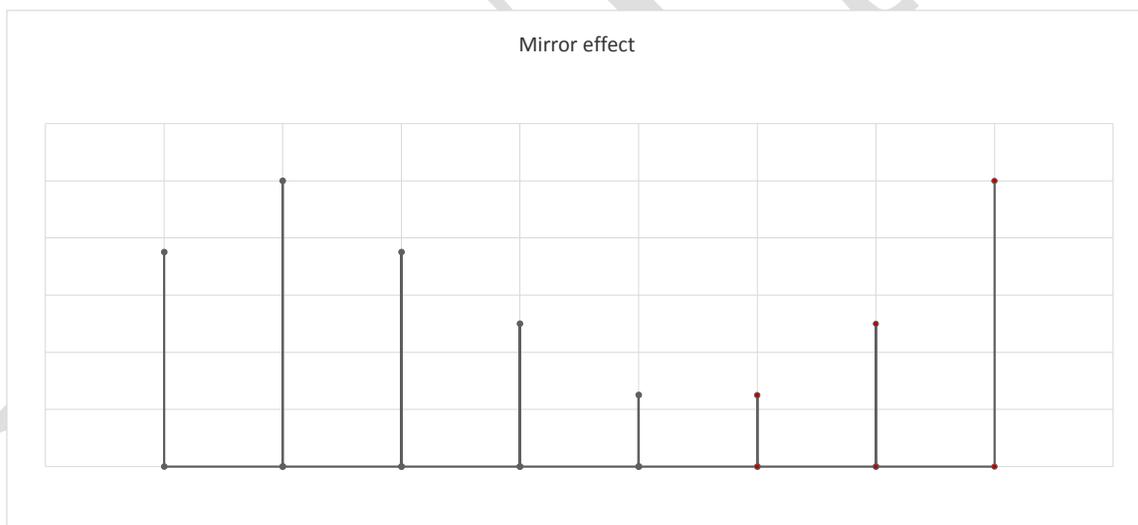


Figure 3. Mirror effect, under Fourier transform

In order to get rid of this effect, usually the right side of the spectrum is removed, and the signal amplitudes of the first part of the spectrum are doubled. The amplitude of the constant component is the average value of the function for the selected time interval and is calculated by the formula 4:

$$Am(F(k)) = \frac{1}{N} * \sqrt{Re(F(k))^2 + Im(F(k))^2} \tag{4}$$

Amplitudes and phases of the frequency components of the signal are determined by the following formulas (5), (6):

$$Am(F(k)) = \frac{2}{N} * \sqrt{Re(F(k))^2 + Im(F(k))^2} \tag{5}$$

$$Phase(F(k)) = \arctan\left(\frac{Im(F(k))}{Re(F(k))}\right) \tag{6}$$

The DFT algorithm by the formula looks like this:

```

For(int k= 0;k<N;k++){
  ReF[k] = 0;
  ImF[k] = 0;
  For(int i=0; i<N; i++){
    ReF[k]=ReF[k]+X[i]*cos((2*pi*i/N)*k);
    ImF[k]=ImF[k]-X[i]*sin((2*pi*i/N)*k);
  }
}
    
```

Figure 4. The abstract DFT code

As you can see, this algorithm uses two loops, one embedded, in the worst case, the complexity of this algorithm will be  $O(N^2)$ , respectively, this algorithm will work very slowly on large amounts of data. It is possible to significantly increase the speed of DFT execution by applying the DFT algorithm, whose worst-case complexity is  $O(N \log(N))$ . This is achieved by splitting the original array of numbers into two, followed by a recursive calculation of each array of DFT numbers and combining the results of the calculations. There are two basic algorithms of the FFT: with time-thinning and frequency.

**Thinning by Time**

The initial array of numbers (N) is divided into two sets of numbers with N/2 samples: even  $f_1(n) = f(2*n)$  and odd  $f_2(n) = f(2*n+1)$ . The DFT formula is transformed into the formula (7):

$$F(k) = \sum_{n=0}^{N-1} f(n) * e^{-j*2*\pi*n*k/N} = \sum_{n=0}^{N/2-1} f_1(n) * e^{-j*2*\pi*2*n*k/N} + \sum_{n=0}^{N/2-1} f_2(n) * e^{-j*2*\pi*(2*n+1)*k/N} \tag{7}$$

The last expression can be transformed into the formula (8):

$$F(k) = \sum_{n=0}^{N/2-1} f_1(n) * e^{-j*\frac{2*\pi}{N}*n*k} + e^{-j*\frac{2*\pi}{N}*k} * \sum_{n=0}^{N/2-1} f_2(n) * e^{-j*\frac{2*\pi}{N}*n*k} \tag{8}$$

As a result, we obtain expressions for determining the function at two frequency intervals, formulas (9) and (10):

$$F(k) = \sum_{p=0}^{\frac{N}{2}-1} f_1(n) * e^{-j * \frac{2 * \pi}{N} * p * k} + e^{-j * \frac{2 * \pi}{N} * k} * \sum_{p=0}^{\frac{N}{2}-1} f_2(n) * e^{-j * \frac{2 * \pi}{N} * p * k} = F_1(k) + e^{-j * \frac{2 * \pi}{N} * k} * F_2(k), k = 0, \dots, \frac{N}{2} - 1 \quad (9)$$

$$F\left(k + \frac{N}{2}\right) = \sum_{p=0}^{\frac{N}{2}-1} f_1(n) * e^{-j * \frac{2 * \pi}{N} * p * k} - e^{-j * \frac{2 * \pi}{N} * k} * \sum_{p=0}^{\frac{N}{2}-1} f_2(n) * e^{-j * \frac{2 * \pi}{N} * p * k} = F_1(k) - e^{-j * \frac{2 * \pi}{N} * k} * F_2(k), k = 0, \dots, \frac{N}{2} - 1 \quad (10)$$

When you combine the results of calculating these functions, you get the signal spectrum. However, the spectrum is filled with useful information by exactly half, up to N/2, as follows from the Nyquist-Kotel'nikov theorem.

**Thinning by Time**

Thinning in time works on the same principle, with small differences, according to the formula (11):

$$F(k) = \sum_{n=0}^{N-1} f(n) * e^{-j * \frac{2 * \pi}{N} * n * k} = \sum_{n=0}^{\frac{N}{2}-1} f_1(n) * e^{-j * \frac{2 * \pi}{N} * n * k} + \sum_{n=0}^{\frac{N}{2}-1} f_2(n) * e^{-j * \frac{2 * \pi}{N} * (n + \frac{N}{2}) * k} \quad (11)$$

What is transformed into the formula (12):

$$F(k) = \sum_{n=0}^{\frac{N}{2}-1} (f_1(n) + e^{-j * \pi * k} * f_2(n)) * e^{-j * \frac{2 * \pi}{N} * n * k}, k=0, \dots, N-1 \quad (12)$$

As a result, we obtain the following expressions for even and odd samples, formulas (13) and (14):

$$F(2 * k) = \sum_{n=0}^{\frac{N}{2}-1} (f_1(n) + f_2(n)) * e^{-j * \frac{2 * \pi}{N} * n * k} \quad (13)$$

$$F(2 * k + 1) = \sum_{n=0}^{\frac{N}{2}-1} ((f_1(n) + f_2(n)) * e^{-j * \frac{2 * \pi}{N} * n}) * e^{-j * \frac{2 * \pi}{N} * n * k} \quad (14)$$

The application of this algorithm is analogous to the application of the algorithm, which is thinnable in time, the complexity of the algorithms and the result are identical.

The main disadvantage of the FFT is that the amount of input data must be a power of two. However, the FFT is much faster and somewhat more accurate than calculating the DFT directly by the formula due to the lesser complexity of the algorithm and reducing rounding errors, reducing the number of operations.

**Window Functions**

Performing the discrete Fourier transform by one of the above methods, we obtained the amplitude-frequency spectrum of the signal. However, spectral analysis in theory is intended for continuous functions, and we work with a limited set of data, otherwise the execution of this transformation would

take an infinite amount of time. And there is a regularity: the larger the frame size (the amount of data per time passing through the DFT), the better the frequency resolution (the most accurate definition of the frequencies composing the signal) we get, but the worse the resolution in time (worse performance). In practice, high-frequency components appear in the cut-off areas of the function, the window functions that smooth the signal in each analyzed segment are applied to combat them. The application of the window function is to pre-multiply the samples of the input signal to it and only then the spectrum is calculated. When applying the DFT, a rectangular window is automatically used, its function is as follows:

```
public static double Rectangle(double n, double frameSize)
{
    return 1;
}
```

Figure 5. The C++ code of rectangular window

As you can see from the code above, it does not in any way smooth out the incoming function, but only limits the frame size. Figure 6 shows a rectangular window, and side lobes (artifacts appeared at the cut):

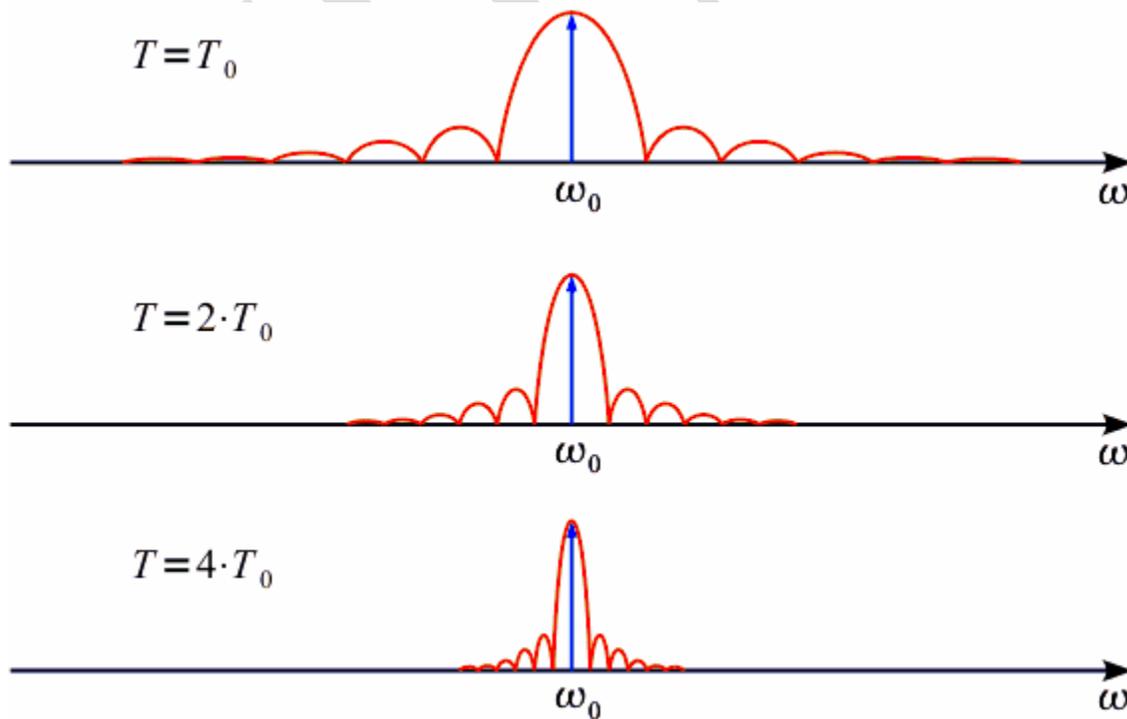


Figure 6. Rectangular window

It is clearly seen from the figure that the larger the frame size, the smaller the side lobes, and the closer the spectrum to the delta function (single pulse). In the example above, the side lobes did not cause any inconvenience, but there may be a situation where a signal with a smaller amplitude is lost in the side lobes, as in Figure 7:

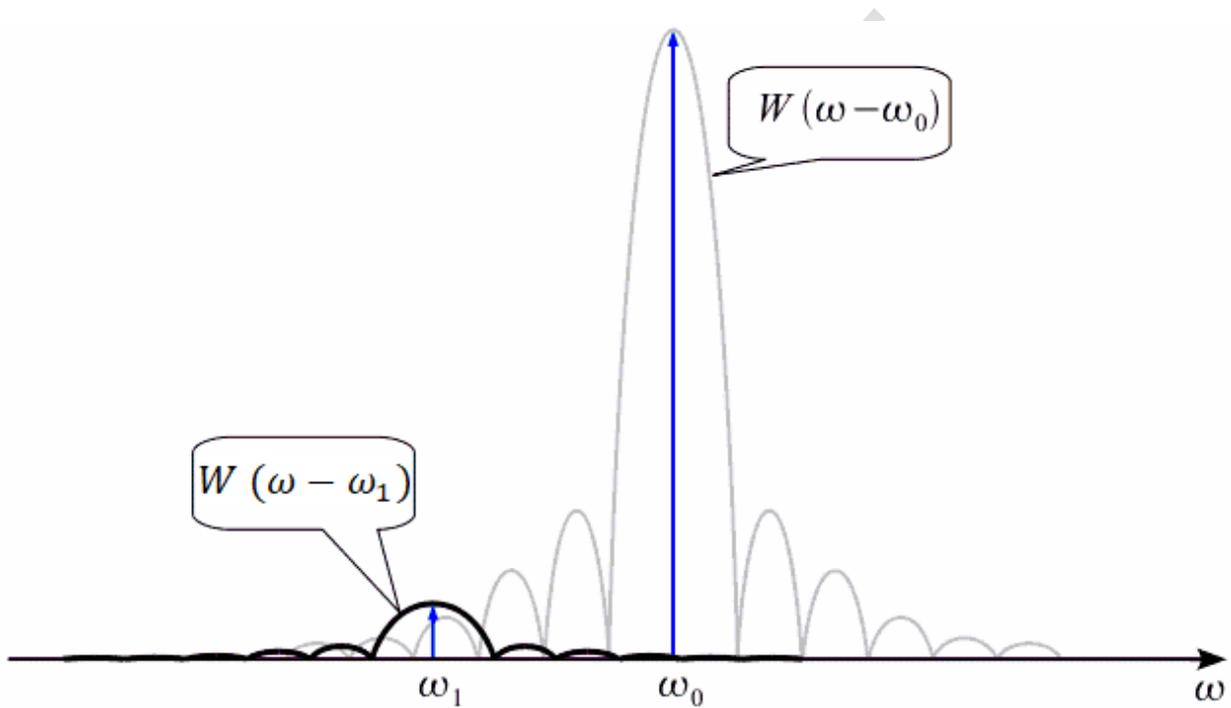


Figure 7. The smaller amplitude signal is lost in the side lobes

In order to avoid this, it is necessary to use window functions with anti-aliasing. There are a lot of such functions, and in order to choose the right one, one must adhere to certain rules. We introduce the formulas (15), (16), and (17), which will help in the calculations:

$$\Delta f = \frac{F_s}{N} - \text{distance between spectral readings, where} \tag{15}$$

$F_s$  - sampling frequency;

$N$  - number of signal samples (FFT size).

$$D = 20 * \log_{10} * 2 = B * 6,02 \text{ dB, where} \tag{16}$$

$D$  - dynamic range of the signal in decibels;

$B$  - number of bits of ADC.

$$\Delta F = \Delta F_0 * \Delta f - \text{width of the main lobe in hertz, where} \tag{17}$$

$\Delta F$  – the normalized width of the main lobe of the spectrum, the tabulated value.

When choosing a window function, it is necessary to consider the following:

the level of the side lobes of the spectrum of the window function must be less than the specified dynamic range, the level of the side lobes is tabulated, the dynamic range is calculated by formula (16);

If a specific resolution is specified for the frequency  $\delta f$  at which you want to analyze the spectrum, you must fulfill the condition:  $\delta f > \Delta F$  or  $\delta f > \Delta F_0 * \Delta f$ . With the given window selected in step 1,  $\Delta F_0 = const$ , the fixed sampling frequency, in order to increase the frequency resolution it is necessary to increase the size of the FFT sample, using the following formula (18):

$$N > \Delta F_0 * \frac{F_s}{\delta f} \tag{18}$$

Next, in figures 8 and 9 respectively present examples of wrong and right the calculated window parameters:

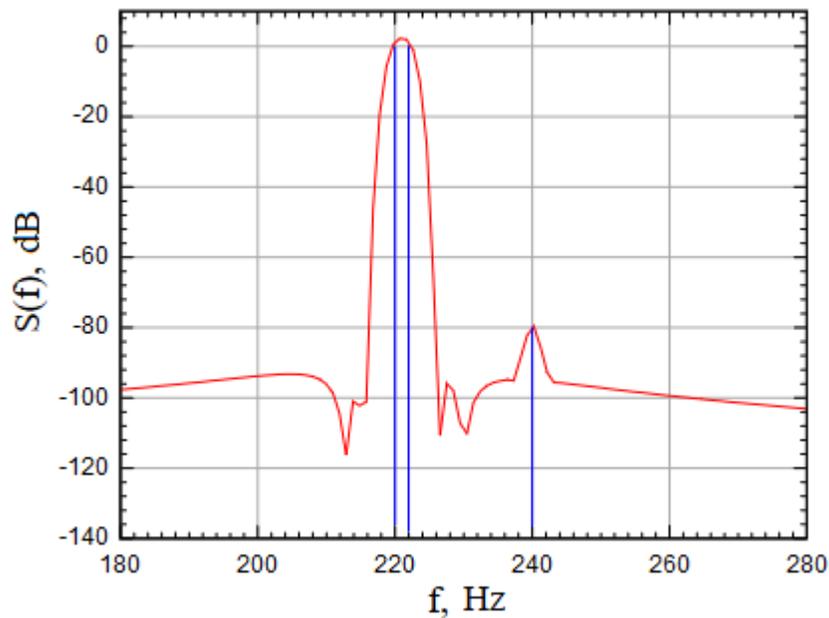


Figure 8. The Blackman-Nuttall window, sample N = 1024

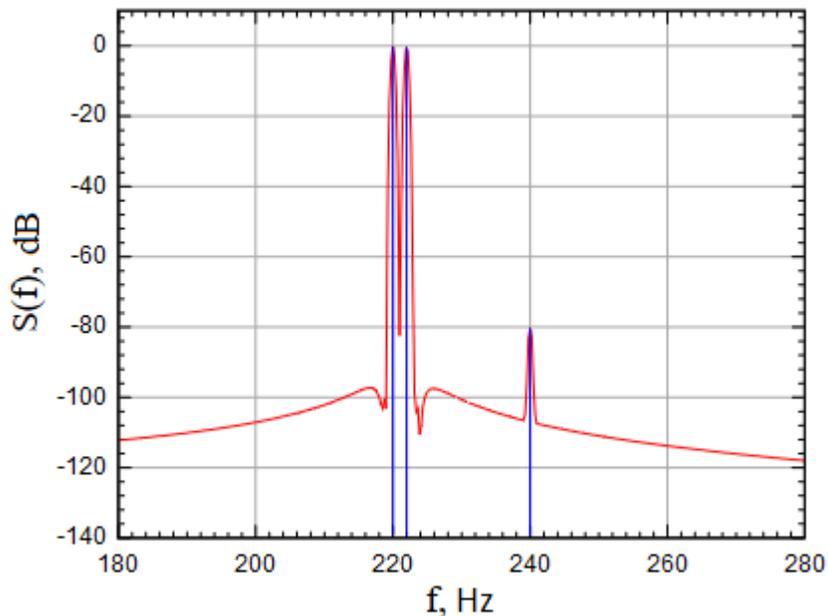


Figure 9. The Blackman-Nattal window, sample  $N = 4096$

Figure 9 shows that all the frequencies were determined correctly, but we had to sacrifice the resolution in time for the sake of not losing the frequency at 222 Hz.

### Filtration

After receiving the signal spectrum smoothed by the window function, it is possible to start filtering the aliasing, which was mentioned above. The principle of the filter is as follows: the cutoff frequency is set, all frequencies that are less than or equal to this frequency pass through the filter. And for all frequencies above the cutoff frequency, the filter reduces the amplitude to zero.

In order to move on you need to understand the principle of operation and application of the filter. To do this, we introduce the notion of a discrete linear system. A discrete linear system is any system for which the response of a system to the sum of impacts is equal to the sum of the responses to each action that operates with discrete signals. For it, the linearity property must hold: if  $x_1(t) \rightarrow y_1(t)$  и  $x_2(t) \rightarrow y_2(t)$ , then  $a * x_1(t) + b * x_2(t) \rightarrow a * y_1(t) + b * y_2(t)$ .

Since the recorded sound, as mentioned above, is a digital discrete signal, you can display it as in Figure 10:

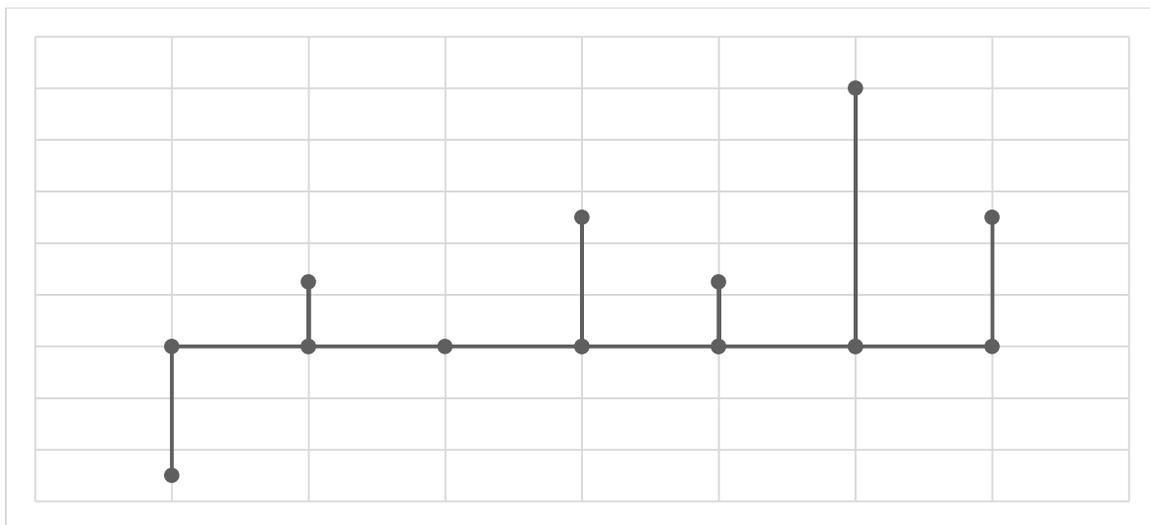


Figure 10. Digital discrete signal

For understanding how the system transforms input in output, consider the response of the system is the digital Delta function. The Delta function is a signal of the form  $[n] = \begin{cases} 1, n = 0 \\ 0, n \neq 0 \end{cases}$ , i.e., the unit impulse, figure 11.

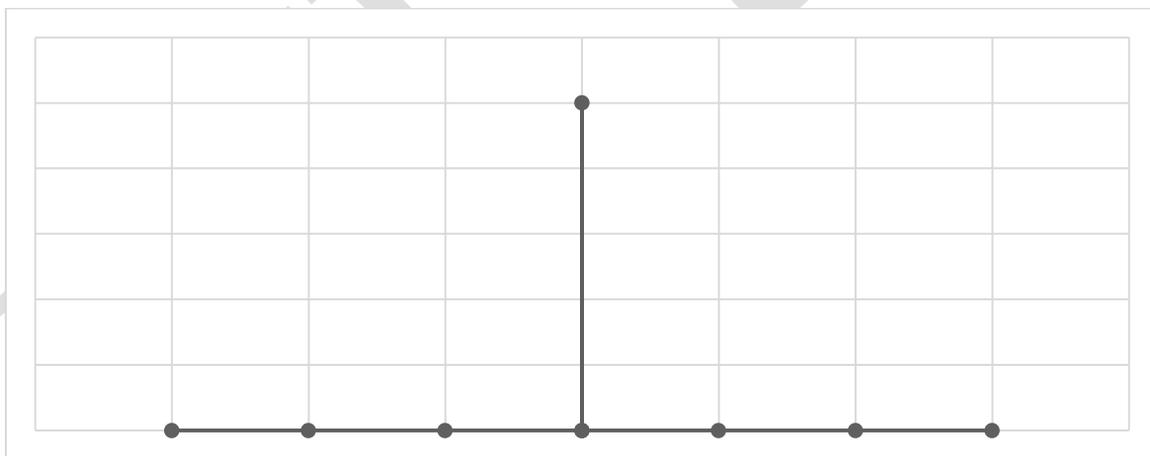


Figure 11. Delta function

Obviously, any discrete signal can be decomposed into a sum of such functions, shifted in time. For example, an infinite signal  $x[n]$  one can imagine how  $x[n] = \sum_{-\infty}^{+\infty} x[i] * \delta[n - i]$ . In this equation, the delta function is the basis function, and  $x[i]$  are their coefficients. Next, consider the response of the system to the supplied delta function. Let the output signal be  $h[n]$ , i.e.  $\delta[n] \rightarrow h[n]$ . The process is shown in Figures 12 and 13.

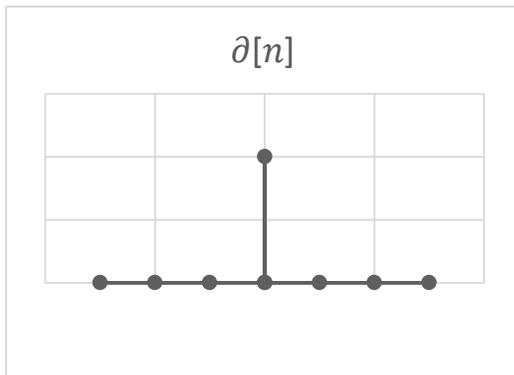


Figure 12. Input delta function

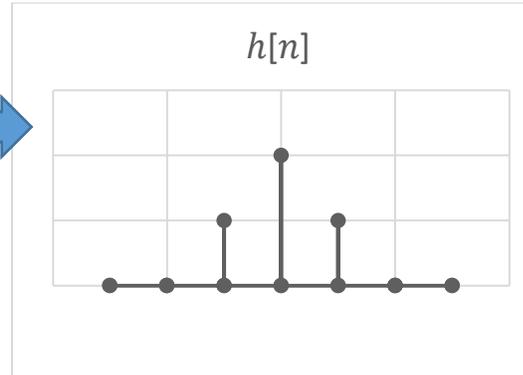
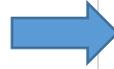


Figure 13. System response to it

Thus, it becomes clear that, knowing the response of the system to the delta function, it is possible to calculate the response of the system to any input signal and, correspondingly, the output signal. Since any input signal is a combination of time-shifted delta functions  $h[n]$ , the output signal will be a combination of time-shifted response functions, this follows from the linearity property described above. We know the response of the system  $h[n]$  (in the figure above), the input is given  $x[n]$  in Figure 14, calculate the output signal.

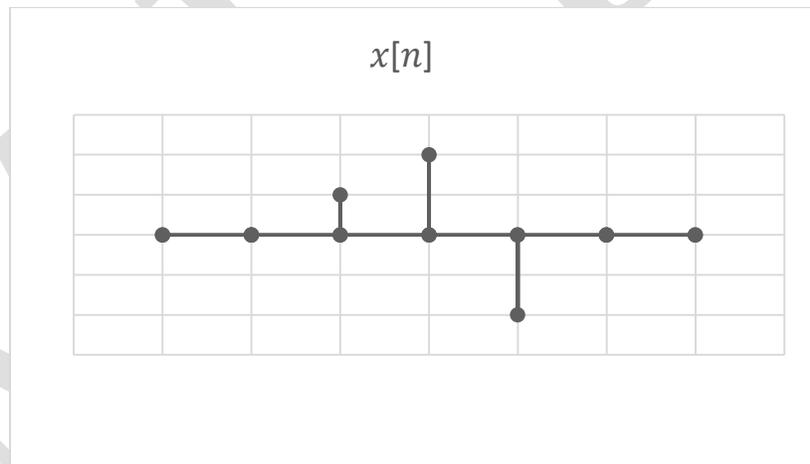


Figure 14. Input signal

The output signal  $y[n]$  will be as follows, figure 15:

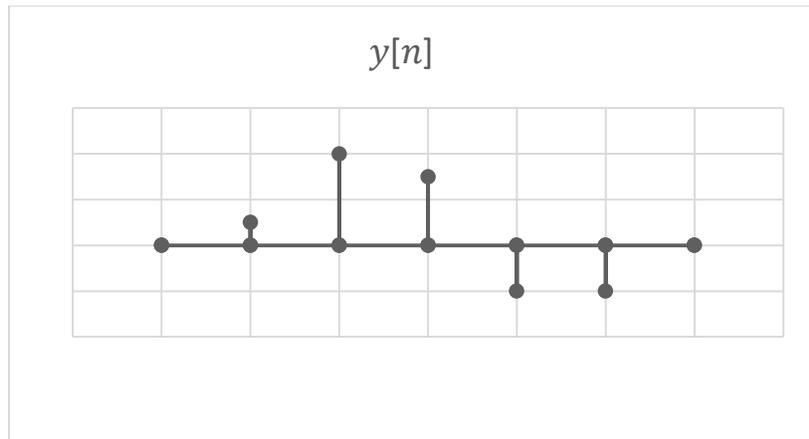


Figure 15. Output signal.

In addition to the method described above, the response of a linear system can calculate the value of each point in the resulting signal as a weighted sum of a number of neighboring points of the original signal. The coefficients of this sum coincide with the impulse response of the linear system inverted with respect to the point 0. We can derive the formula (19):

$$y[n] = \sum_{k=-\infty}^{+\infty} x[n - k] * h[k] \tag{19}$$

This operation is called a convolution, and the function  $h[k]$  is called the convolution kernel or the impulse response of a linear system.

Direct calculation of convolution requires  $N * M$  multiplications, where  $N$  is the length of the original signal, and  $M$  is the length of the convolution core  $O(N^2)$ , the complexity of the algorithm in the worst case is very slow. However, there is a method of rapid convolution.

**Results**

Convolution theorem: convolution in the time domain is equivalent to multiplication in the frequency domain; multiplication in the time domain is equivalent to convolution in the frequency domain.

Proceeding from the above-described theorem, to perform convolution, it is enough to translate the signals into the frequency domain by means of FFT, multiply their spectra and transfer them back to the time domain. To convert to the time domain, the inverse FFT is used. To perform an inverse FFT, replace (20) with:

$$F(k) = \sum_{n=0}^{N-1} f(n) * e^{-j * \frac{2 * \pi}{N} * n * k} \tag{20}$$

On the formula (21):

$$F(k) = \sum_{n=0}^{N-1} f(n) * e^{-j * \frac{-(2 * \pi)}{N} * n * k} \tag{21}$$

Returning to the topic of filters, performing multiplication of spectra under convolution is just called filtering. When the spectra are multiplied as complex numbers, the amplitudes of the harmonics of the original signal and the convolution core are multiplied. Thus, it becomes possible to change the signal

spectrum. In the general case, the filter changes the amplitude of the harmonics and from the phase in the signal spectrum, however the filters can be designed so that they do not change the phase of the signal. Such filters are called filters with a linear phase. The main property of the filter is its frequency and phase characteristics, they show how the filter affects the original signal.

If the coefficients are selected correctly, when carrying out the convolution (filtering), it will be possible to obtain a simple low- or high-pass filter with a finite impulse response (FIR). There are also filters with infinite impulse response (IIR), such filters use their outputs as a stroke, and with their application it is possible to filter the signal in real time, but this is too much material for this article, and therefore will not be considered.

### Conclusion

The described technology of improving the quality of sound digitization was appreciated. The assessment made technicians organization "Scientific-production complex, scientific-research Institute of distant radio", Moscow. Used mathematical tools in practice improving the quality of digitized sound. These studies were based on the analysis of works by Russian and foreign authors such as D.G. Artemov & V.E. Ponimatkin (2017), R.R. Babayan & V.P. Morozov (2017), S.V. Kashirin (2015, 2016), E.A. Khitskov et al. (2017), V.A. Zhiron (2017), S.V. Veretekhina et al. (2017), S.V. Veretekhina (2013), S.V. Veretekhina, A.V. Medvedeva & E.A. Khitskov (2017), E.G. Klimova, S.B. Medvedev & A.N. Savostyanov (2016), N.Yu. Kudryashov, V.A. Kuklin & K.Yu. Trifonov (2017), V.E. Lichtenstein, G.V. Ross & M.G. Beach (2014), A.N. Maloletko & N.E. Maloletko (2016), N.R. Popov & I.N. Popov (2009), A. Solonina (2009), G.M. Kvon et al. (2017). The efforts of these scientists formed a fundamental basis for the study. The technology describes the processing of discrete digital signals. The technology involves the conversion of analog signals to discrete digital signals. Additionally, computer limitations are considered. Identified problems that arise when sampling the signals. The ways of their solution are given. Identified the need to transform discrete signals from the time domain into a frequency region. The perfection of the described technology lies in the necessity of digitizing the signal with high quality of its recovery into an analog signal. In the era of the digital economy, all types of digitization are of great importance, because in the future there will be a need to visualize images and build a virtual augmented reality using an audio signal.

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## Student Research Activity Organization In Universities Of Art And Culture

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**Abstract:** The relevance of the paper is due to the appeal to the multidimensional problems of student professional development of culture and art universities, taking into account the public request for competent specialists who have fundamental theoretical and practical training. The purpose of the paper is to reveal a complex of didactic and psychological-pedagogical measures aimed at the productive organization of student research activities of future specialists in the field of culture and art. The authors determined the directions for the student research activities organization: the disclosure of scientific work potential within the framework of the profession chosen by students; introduction of technologies for the development of creative abilities into the educational process and the individual creative potential liberation ; activation of student independent scientific research activities in the context of interaction with various cultural and art institutions; interrelation of traditional and innovative methods for humanitarian training of future specialists in the field of culture and art; implementation of student research activities pedagogical model developed in the research. In the structure of student research activities, several interrelated components have been identified: motivational; creative; communicative one. The principles for achieving consistency and structuring of training courses in student research process are defined. The professionogram of the student-researcher is developed. The results of experimental work on the introduction of the pedagogical model for the organization of student research activities in the conditions of universities in the sphere of culture and art are described.

**Keywords:** student research activities, pedagogical accompany, professionogram, creative potential, motivational components, communicative component, professional self-determination

## Introduction

Prospects for higher education development in the field of culture and art are associated with the implementation of several key components, namely:

- Creation of the educational environment of the university, which implies the lessons' content deepening by strengthening the humanitarian component, involving students acquaintance with the culture values, developing their readiness for creative self-realization in a multicultural environment;
- Support of student independent research activities aimed at the formation of a sustainable motivation for personal and professional development;
- The development of future specialists in the field of culture and art as competent professionals who are able to adapt organically enough in modern sociocultural conditions and that have fundamental theoretical and practical training.

The experience of pedagogical work with students-future specialists in the field of culture and art proves that in many respects the problems solution facing the higher education is possible if the organization of student scientific research activities is planned and meets the modern requirements, and creates the conditions to form the integral world picture; socio-cultural reflection, the qualities of professional stability and goal-setting. In addition, students who are actively engaged in independent scientific research, possess the growing motivation for self-development, self-realization in the chosen profession, as in this way in the development of knowledge and professional competencies they experience transfer of their content to the level of personal senses (Flier, 2000).

Of particular importance are research projects related to the educational field "Art", as this area can provide students- the researchers with the opportunity to study, immerse, comprehend the essence of culture, a modern multicultural society development and understand their professional goals in the process of cultural values' broadcasting to society, which is a mission of a specialist in the field of culture and art (Stukalova, 2016).

Thus, the student research activities can be called one of the factors determining the development of higher education in the field of culture and art. This activity is a process of cultural values interiorization, the development of a sustainable motivation for personal and professional development, the development of oneself as a "man of culture" with readiness for creative self-realization in the chosen profession of a specialist in the field of culture and art and for implementation of educational activities in a modern multicultural space.

The problems of student self-development, stimulation of their cognitive interests, creative thinking and style of research activity were considered in their works by V.I. Andreev (1996), G.M. Kodzhaspirova (2003), Yu.N. Kulyutkin & I.V. Mushtavinskaya (2002), I.Ya. Lerner (1970), M.I. Makhmutov (1972), P.I. Pidkasisty (2014), V.A. Slasterin (2002), etc. Development of the individual creative potential in the process of independent scientific research was considered by such scientists as J. Guilford (1982), V.V. Davydov (1996), N.S. Leites (2001), K. Taylor (2002) and others. Pedagogical aspects of creatively developing opportunities for training specialists in the field of culture and art are revealed in the works of A.D. Zharkov (1998), Yu.S. Streltsov (1999) and others.

In general, the student research activities reflect such manifestations in the formation of a professional, as:

- The creative activity;

- Readiness to transform in the minds the subjective images of reflected objects, their significance and meaning for resolving real contradictions in the circumstances of people's livelihood, for the formation of new goals, the discovery of new means and plans for their achievement;
- The ability to resolve problem situations that require an active change of the conditions in which this or that situation is specified.

In the process of independent scientific research, the student gets the opportunity to solve the most non-trivial creative task by means of unusual ways out of reasoning with the help of methods not known to him before (Lipskaya, 2006).

In the works of D.B. Bogoyavlenskaya (2002), V.N. Druzhinin (2004), A.V. Khutorskoy (2003) the criteria are described that characterize the high level of the individual's readiness for this type of activity. Among the indicators revealed by scientists, the following are of particular interest:

- Presence of positive motivation, based on the manifestations of independence of students' knowledge acquisition, desire to receive satisfaction from the research process and its results;
- Manifestation of independence, reflected in the ability to plan, organize their activities, think and act independently;
- The ability to master new knowledge, technology;
- Self-expression of the individual in various forms of the results presentation obtained in the study;
- Qualitative level of professional knowledge;
- The manifestation of creative thinking, characterized by the ability to generalize and abstract;
- Quickness, flexibility, mobility of cognitive processes, mental operations, forms of thinking, diverse experience of activity;
- The ability to modify, combine, vary their own research activities in a non-standard way;
- Goal-setting, personality adherence to the professional / creative task set for oneself, purposefulness;
- Presence of communicative culture and developed skills of communicative competence;
- Personal qualities: initiative, high self-organization, diligence (Mizell 2010).

Despite the obvious influence of the student research activities on the productive solution of professional development problems at all its stages - from professional choice, self-determination to professional adaptation and improvement, in higher education institutions in the sphere of culture and art, this component of the educational process is not actively developing (Kagan, 1998). In many ways, this is due to the insufficiently thoughtful organization and student research activities' modeling, the prioritization of the festival-competitive movement, without taking into account the significance of theoretical training level rising. Meanwhile, for future specialists in the field of culture and art, as well as for future physicists, chemists, mathematicians, it is very important to harmonize the notion of "self as professional" with the notions of the profession, the awareness of one's own role in achieving success, the acquisition of professional skills and building one's own future, associated with self-realization and self-actualization in the profession (Kulyutkin & Suhovskaya, 1996). It is these tasks that are solved by an active, personally significant scientific and research activity, organized in the educational environment of the university and

having qualified pedagogical accompany. This paper summarizes the experience that can be useful to professionals working in this field.

## **Materials and Methods**

### **Methods of research**

The modeling of student research activities organization is based on the study of the socio-psychological characteristics of students at universities of culture and art. It is established that, in addition to the features which are common to this age, students who have chosen the culture and art as their profession have certain features that determine the choice of directions for independent scientific research. Student age, according to the research of the psychological school by B.G. Ananyev, is a "sensitive period for the development of man basic socio-genetic potential" (Ananiev, 2001).

The study of students' personal changes actively engaged in scientific research was conducted on the basis of the following methods: a questionnaire for assessing the syndrome of mental burnout, a scale of depression (according to T.I. Balashova, O.P. Eliseev) (Bespal'ko,1995), Beck's questionnaire for diagnosing depressive states, the Tsung depression scale(Bespal'ko,1995) , a technique for assessing psychological activation, interest, emotional tone, tension and comfort (according to N.A. Kurgansky and T.A. Nemchin) (Istratova, 2006), anxiety test Ch.D. Spielberger (Khanin, 1976) a technique for measuring anxiety level by Taylor, an anxiety test by V.M. Astapov (Istratova, 2006), a technique for detecting the degree of low mood severity - sub-depression (according to V.Zung - T.N. Balashova) (Bespal'ko,1995), the technique "Differential scales of emotions" (according to K. Izard (1999).

The conducted research has proved that students, motivated to improve their theoretical level on the basis of inclusion in scientific activity, possessed indicators for the criteria of depressiveness, anxiety, feelings of loneliness which were reduced. Mastering the theory allows looking at the problems of one's own professional development from a philosophical point of view, thereby evaluating them more adequately.

### **Experimental base of the research**

The students of the Moscow State Institute of Culture (480 people): the faculty of socio-cultural activity, the choreography faculty, the faculty of pre-university training became the experimental base of the research. Also, a leading group was defined- students, who constantly showed high rates according to the selected criteria of research and professional development. This group included 18 students of the choreographic faculty and 25 students of socio-cultural activities faculty.

### **Stages of the research**

At the organizational and preparatory stage of the experimental work, a sociological survey was conducted among the applicants and graduates of such high schools in the sphere of culture and art in Moscow, as Moscow State University of Culture and Arts, All Russia State Institute of Cinematography named after S. A Gerasimov, Academy of Watercolors and Fine Arts named after Sergey Andriyaka - 325 people for 3 years were surveyed (2014-2017). The purpose of the interviews was to compare the expectations of the entrants from higher professional education in the sphere of culture and art and the degree of satisfaction with the education received among the graduates.

A generalization of the obtained results allows us to conclude that:

1. The majority of applicants entering the university of culture and art believe that the most interesting area of personal and professional development is performing (vocals, dance, film and television actor), creating the advertising, directing. At the same time, many of them overestimate their creative abilities, unclearly represent aspects of professional development, most of all dreaming of popularity. The level of general scientific training of applicants is low (48%), medium (36%), high (16%) - these data are taken from the analysis of student's introductory work and interview. The concepts of «profession's mission», "professional duty", "culture creating", "spiritual leisure" are unfamiliar for most entrants, the formulation of these concepts causes a noticeable difficulty. Only 6% of students were able to respond to these questions in a precise and profound manner, singling out the value component in the professional activity of a specialist in the field of culture and art ("it is important for people to disclose the meaning of morality", "society should be attached to art", "we have little social advertising, I want to do just that and make the world more kind and patient", etc.). The knowledge component of the educational process took only the third place after the component of professional skills and student public life. In general, the expectations from the educational process in the University of Culture and Art among the majority of applicants were overstated, inadequate to the real state of affairs, which did not correspond to their own abilities and needs.

2. Graduates critically evaluate the effectiveness of academic work's and research activities' organization in universities of culture and art. To the question of the questionnaire: "Would the students have chosen their specialty again?" 56% answered affirmatively. The reasons for the dissatisfaction of graduates can be summarized as follows:

- dissatisfaction with the training organization (there is no good educational and methodical literature - this claim was contained in 52% of questionnaires, there is no free access to modern information technology - 43%, lessons on general scientific disciplines are boring and monotonous - 86%, many training courses are sketchy and unclear, why they are needed in the future professional activity - 78%, little time is devoted to independent creative tasks, projects, etc. - 89%);

- A critical assessment of the relationship with teachers (68% consider that authoritarianism and indifference dominate, teachers are not eager for creative interaction, their task is "to lecture their lectures and no more" - 54%, teachers are incompetent and do not improve their competence level (especially in the field of contemporary art) - 68 %);

- Poor organization of research work (there are no creative meetings, joint discussions, scientific projects; there is no support for teachers - 86%).

On the question of whether graduates consider that their level of education and theoretical training to be appropriate to modern requirements, in average 43% answered affirmatively. This echoes the affirmative answer of the graduates to the question of the questionnaire: "Does the process of learning contributes to the adaption to life and professional activity in modern conditions?" - 47% of respondents. At the same time, 40% of the graduates surveyed are optimistic about the possibility of their self-realization in their chosen profession, 23% - on average are uncertain; 37% of graduates are ready to work, regardless of their specialty, with the main goal to get a good salary.

The dominance of material values was revealed, aspiration to achieve the goal by any means (41% of respondents noted that "the main thing in work is how much they pay for it", and 44% of respondents believe that the modern world is cruel in order to survive and succeed, it is necessary to fight for one's own place in it, and even miss some norms of morality). In general, the degree of satisfaction with the

education received can be considered lower than the average one (38-40%). Most graduates gave formal answers to questions about the essence of the "professional mission", "professional duty", the value component of the chosen specialty turned out to be significant only for 15% of the respondents.

Thus, the hypothesis of student independent scientific research activity activation, qualitative changes in the content of education and principles of lessons organization was confirmed, which requires the building of a special educational environment and reliance on the pedagogical model of student research activities organization in a university environment in the sphere of culture and art. The structure of the experiment and the change in its stages were influenced by the fact that students of all courses were involved in its conducting, from the moment they entered the university to the graduation.

At the forming stage of the experiment, a set of didactic and psychological-pedagogical measures was introduced aimed at the productive organization of research activities of students-future specialists in the field of culture and art. In the educational environment of the university, such areas of student scientific research activities organization were carried out, such as: the disclosure of scientific work potential within the chosen profession; the introduction of technologies for the development of creative abilities and the emancipation of the individual's creative potential; activation of student independent scientific research activities in the context of interaction with various cultural and art institutions; interrelation of traditional and innovative methods of humanitarian training of future specialists in the field of culture and art. Also, a pedagogical model of student research activities was implemented.

At the control stage of the experiment, the dynamics of student professional development was studied; the correlation of this dynamics with the activity and quality of their research work was assessed. The assumption was confirmed about the need to re-emphasize students' motives for creative self-realization in independent researches, which reveals for them the personal significance of achieving high educational goals of their profession, self-actualization in cultural creation.

## Results

In the experiment it was revealed that the students' value attitude toward the profession changes in the course of their active involvement in independent research activities. Among the students of the experimental group, on average, it increases by 15-20%. The students of the leading group show a high level of value attitude towards the profession - 95%. This is manifested in their activities. Pedagogy of art as an area of application of knowledge and professional development has become popular with the majority of students of the leading group. They organized choreographic and art studios, distance learning courses for novice screenwriters, children's film festivals and exhibitions of photo works, etc.

The study identified:

a) the principles of pedagogical accompany of student research activities in the educational environment of culture and art university, which include the following components:

- structuring and selection of student scientific projects' content;
- transferring of independent scientific research content from the level of values to the level of personal meanings, the integrity of the education content sources;
- The use of innovative educational technologies (creation of a dialogic lesson space, design technologies, etc.);

- the correlation between the dynamics of culture and personality;
- activation of self-development of the person;
- Determination of scientific projects' content by leading cultural traditions, national and universal values, moral and aesthetic ideals;
- dialogue of cultures;
- Development of motivation for professional development.

b) criteria for high-level scientific research activities of students, namely: 1) the organic and productive mix of general cultural, social, teaching and upbringing components in each student's study or project; 2) achievement of effective conditions for the qualitative research activities of each student, based on the principles of the person-oriented approach and the deepening of the lessons' content in the process of working on projects by strengthening the humanitarian component, involving students in the values of culture and developing their readiness for cultural creation, creative self-realization in a multicultural space.

In the course of longitudinal monitoring of graduates of culture and art higher educational institutions, components were determined on the composition of the profессиogram of the student-researcher (table 1). Profession program is a systemic description of the pedagogical, social, psychological and other requirements which are necessary for the formation of a modern highly professional student-researcher in the field of culture and art.

**Table 1.** Profессиogram of the student-researcher

<b>Professionally significant qualities of student-researcher</b>	<b>Personal qualities of a student-researcher</b>
psycho-pedagogical, cultural, art and methodological knowledge	social maturity, activity, awareness
the desire for professional development	cognitive interest
professional skills in dealing with information	purposefulness and initiative, information competence

communicative abilities and skills	endurance, self-control, self-regulation, communicative culture
readiness to master new areas of knowledge in team work on scientific projects	justice, sincerity
Reflexive research position	tact, high level of sociocultural reflexion, self-regulation, emotional empathy, self-criticism, adequate self-esteem
organizational and oratorical skills	culture of speech, ability to plan, developed goal-setting
skills in working with theoretical literature	general erudition, intellect
ability to present the results of research adequately, reasonably and convincingly	emotionality, skills of working with media technologies, artistry
ability to analyze, compare facts and generalize	developed logical thinking, concentration, accuracy, responsibility

It was also found that among the manifestations of the high level of student research activities for the future professional activity of a specialist in the field of culture and art the most significant are the following: readiness for joint productive creativity and scientific projects, the ability to engage in dialogical communication in the process of research activity, quick inclusion in research process, high level of professional adaptation, motivation for creative self-realization in the chosen profession, the desire for active research and development. All the above points determine the effectiveness of research activities organization in the educational environment of the university in the field of culture and art, which is based on recognition of the active creative nature of each student, as the source of the personality development is not outside it, but within it.

The considered aspects allowed more clearly structuring the pedagogical model of the student research activity in the sphere of culture and art (see Figure 1).

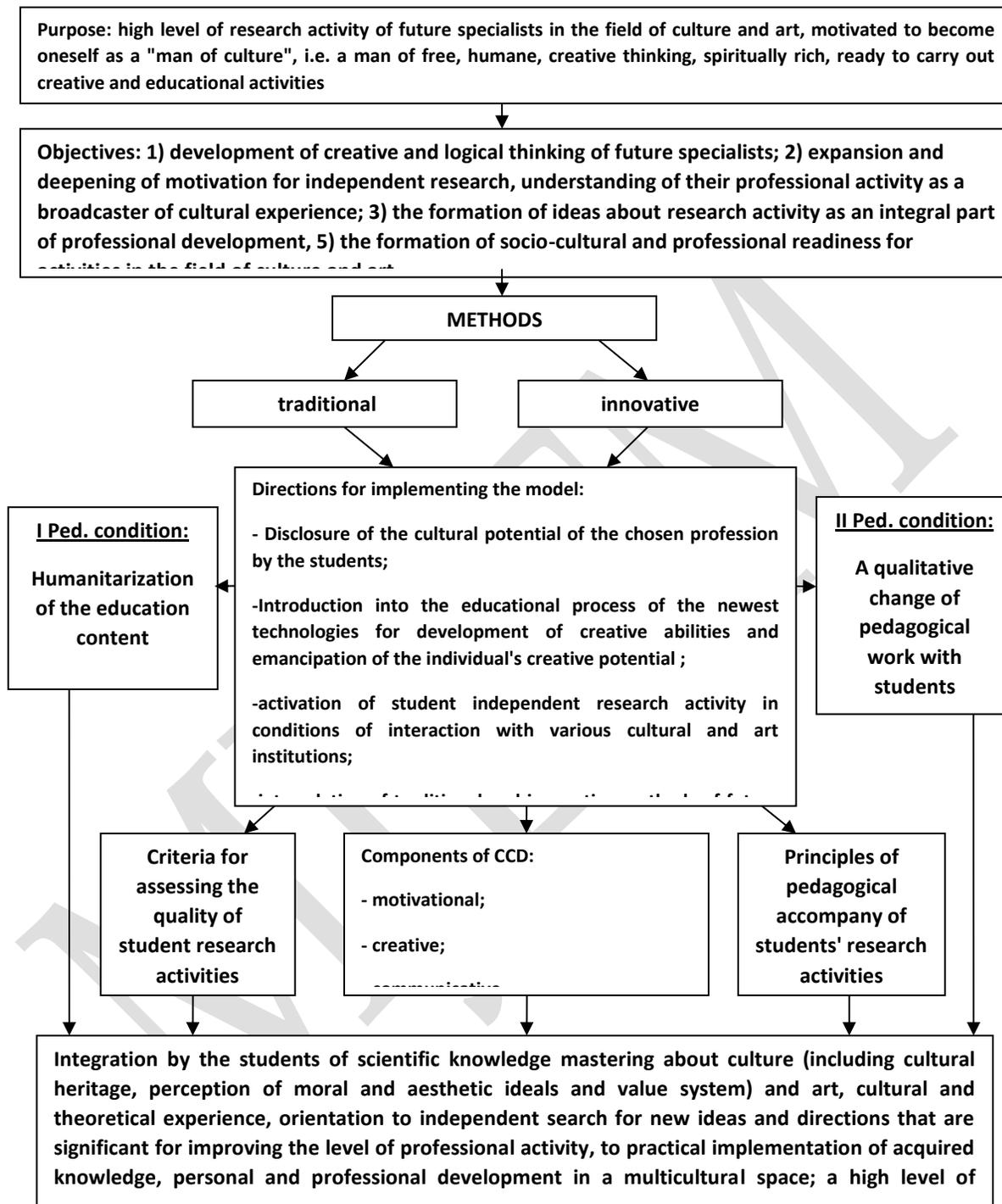


Figure 1. Pedagogical model of student research activities organization

In the course of the experiment, the pedagogical conditions for the implementation of this model were structured.

I pedagogical condition: Humanitarization of the education content of future specialists in the field of culture and art.

Humanitarization provides not only a high quality of knowledge, but also develops moral orientations, a culture of personality, which, consequently, the ability for thoughtful responsible and productive research activity implies, on the one hand, the development of communication skills with theoretical sources, and, on the other hand, the ability to make up a dialogue through these texts with their authors, as a humanitarian educated person is in constant, verbal (mental or direct) dialogue with people who lived and worked before him, is able to understand them, to join the world of their thoughts and feelings (Stukalova, 2016).

The first pedagogical condition for the implementation of the model also includes:

- Integration of traditional and innovative pedagogical methods and technologies;
- balanced ratio of lessons on development of psychophysical, intellectual, aesthetic and ethical spheres of students;
- the possibility of student independent individual and group work on creative and research projects and their presentation to the judgment of spectators and colleagues.

The innovative pedagogical methods (Zeer & Meshkova, 2008) of the humanitarization of the education content include methods aimed at the profound development of the personality, the awakening and formation of abilities for self-development, self-realization and self-improvement, the development of empathy, the ability to reflexing.

Also, the use of modern pedagogical technologies aimed at developing leadership qualities, the qualities for organizing independent research projects, and communicative skills is productive (Fisher et al, 2010). In this case, in the process of organizing research activities, the necessary mix of the creatively contagious atmosphere and the university educational environment takes place: inspiration, intuition, insight, creative search, manifestations of the student individuality; the creation of a dialogue that engenders understanding, discovery, controversy, emotional involvement in spiritual communication to discuss personally and professionally significant problems and research projects.

II pedagogical condition: Qualitative change of pedagogical work with students.

This pedagogical condition includes:

- Horizontal organization of the educational process, which involves changing the pedagogical consciousness, expanding the unit of additional education; involvement in the organization of scientific research activities of active scientists in the field of culture and art, etc.;
- implementation of constant monitoring expertise of student research activities dynamics;
- Dialogization of the lessons' educational space;
- creation of scientific and methodological support for the pedagogical accompany of students-researchers;

-individualization of work with students, understanding of the age features of the student age and the specificity of the professional tasks of scientific research in the field of education in the university of culture and art;

-Strengthening the component of independence in the research of students.

Let us emphasize that the abstract assignments circulated in higher education institutions of the sphere of culture and art lead, in our opinion, to the emasculation of "alive knowledge" (Zinchenko, 1997), which connects the theory with the practice of activity in the sphere of culture and art.

When organizing an independent research activity, the teacher can use a variety of techniques to develop the motivation to increase the intellectual level and master the skills of working with theoretical literature: teaching students the methods of independent research work; problem-based presentation of the material; the establishment of an unambiguous and inextricable link between theory and practice; application of active teaching methods (analysis of pedagogical situations, discussions, trainings, business games, etc.); the rating method of control and the results of independent research work.

### Discussions

The most difficult task in the organization of student research activities was the development of their skills of theoretical analysis, work with scientific literature. The study showed that the students' motivation for enriching intellectual experience is significantly reduced to the fifth year (that is, to the completion of studies at the university), and after graduation it almost goes to zero. This is explained by the realities of modern education: students are forced to earn money for their education, they start working already in the III-IV courses, and in most cases not on the specialty, the work schedule requires a great deal of personal time. All this negatively affects the process of improving knowledge and enriching theoretical experience. The way out of the situation is the organization of group activities, master-classes, training seminars and trainings, communication within which allows creating conditions for intellectual development, enriching theoretical knowledge, raising the level of analysis of art works, understanding the trend of modern culture, etc. An example of such an individualized work is an integrative seminar organized for students of the Faculty of Socio-Cultural Activity and the choreographic faculty of MSUCA in 2017.

The study of student research activities organization peculiarities conducted in the study also revealed that it is most effective to implement it step-by-step, including:

- the conceptual stage - the meaning and content disclosure of an independent research / project, the distribution of functional responsibilities between teachers and students, the formation of a common goal, objectives, motives, the meaning of cooperation;
- project-diagnostic stage - examination of the research / project state on the basis of existing criteria; monitoring of the process effectiveness, identifying areas of research activity, creating an environment in the team of student researchers, participants' psychological and pedagogical training in such a creative research group;
- activity stage - creating conditions for interaction between participants in the student creative research group, summarizing the monitoring materials of the research / project effectiveness, and with the difficulties identified, current diagnostics are carried out to determine the reasons and directions for resolving the difficulties, and the necessary consultations are given;

- reflexive diagnostic stage - final diagnostics based on the results of the study, joint analysis and discussion of the results obtained, making suggestions for correcting the deficiencies, summarizing the experimental material, preparing presentations and speeches at conferences and other events on the presentation of research materials;
- Presentation stage - at this stage a special event is held, which aims to reveal to the public and other students and teachers the results of student research; it is possible that the competitive basis for such events is a good incentive.

### Conclusion

It is established that the student research activities in the conditions of higher professional education in higher education institutions of culture and art should be understood from the standpoint of pedagogy of cooperation, co-creation, joint development of values, norms, tasks, social activities, development of a life position. With this approach, the organization of vocational training's this area begins with the joint development of research objectives, a comprehension of the methods of its implementation and significance for life and professional practice.

In the structure of the student research activity, several interrelated components have been identified: *motivational*: pedagogical situations and tasks that stimulate students to develop and self-develop their research and creative potential, to personal improvement and to increase the level of theoretical training; *creative*: active use of innovative technologies and methods of research in the field of culture and art; *communicative*: tasks aimed at developing the ability to organize activities in the field of scientific research in the university educational environment.

In general, the study determined that the ability to work with theoretical sources, the development of philosophical and art history knowledge are the foundation of personal and professional perfection of future specialists in the field of culture and art. The experiment showed that an in-depth reading of theoretical sources, immersion in independent research, helps to enrich creative strategies for future filmmakers, future actors, future choreographers, musicians and artists.

Thus, the pragmatization of education, which assumes a focus on solving exclusively professional problems, narrows its spectrally, does not create conditions for disclosing the existential meanings of comprehending knowledge. Pragmatization is not equal to the practical orientation of educational courses, which is determined by a qualitative change in the content of education, its appeal to the value foundations of life, art, science, on the one hand, and the identification of professional development possibility based on the development of humanitarian knowledge and theoretical analysis skills, on the other (Ingersoll, 2003).

In general, the increase in the organization of independent scientific research of university students in the sphere of culture and art is a multicomponent process. The motivating factor for this activity is so significant, because the motives play the role of a driving force that directs the person to commit acts, from which the life path develops. Student age is built around the process of identity, consisting of a series of social and individual-personal choices, identification, professional development. When these choices are conducted, the individual is guided by certain motives. The development of education is aimed at the formation of their positive essence. The dominant of material motives cannot serve as the basis for personal and professional development. This is a secondary goal, resulting from the level of professional development. First a person becomes a true professional, constantly expanding the range of

his or her capabilities, including - in the field of theoretical training and research - and only then the person claims a high payment for his or her labor. It is this sequence of motives that ensures the formation of adequate self-esteem and supports the professional resilience of young professionals.

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## Modern Models Of Career Readiness

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**Abstract:** The comparative analysis of career readiness models of domestic and foreign researches has been given in the article. The examples of implementation of the subjective –activity and competence approaches to the study of career readiness are considered in the article. D. Conley’s four component career readiness model is discussed. Main views on the problem of the cognitive component of career readiness have been presented: value mechanisms and mechanisms of decision taking; active goal setting; components of the world view and self-consciousness of the activity subject. It has been proved that the implementation of the subjective and activity approach in domestic studies of career readiness makes it possible to substantiate the determinants of a graduate’s career achievements. A new tendency of the overseas experience integration in the sphere of applied methods of research and graduates’ career readiness development has been identified.

**Keywords:** Professional goals, career readiness, career orientations.

### Introduction

There are two main areas of modern research in graduates’ career readiness: theoretical and empirical studies of the career readiness level where the structure of career readiness is substantiated and its intrastructural interrelationships are revealed (Mironova-Tikhomirova, 2006; Prokopenko, 2011; Lisovskaya, 2012, et. al.) as well as the revision of foreign studies of components, factors and conditions of the career readiness formation (for instance, Lisovskaya with coauthors, 2012). We would like to note that traditions of modeling the career readiness structure in domestic and foreign experience are different. The subjective and activity approach is used in Russian psychology. The psychological structure of career readiness is substantiated through the motivational, value and target (cognitive, evaluative) determinants. Let us compare theoretical and empirical models, that are referred to in thematic publications (Masalimova et.al. 2017; Mitin et.al. 2017).

### Methodological Framework

In A.S. Mironova-Tikhomirova’s (2006) three component model the psychological structure of career readiness is understood as an attitude to the solution of vitally important objectives in the framework of career growth and advancement and it is presented by emotional, motivational and cognitive constituents. A number of specific features of a graduate’s career readiness has been revealed: temporary instability, interdetermination, the priority of career orientations to stability and others. The priority here is given to a cognitive constituent – it is defined as a baseline. A specialist’s career orientations, his goals

and willingness to understand the career environment set the coordinates system for an active position in issues of career self-management, involvement in the process of career changes: «Representing some final (ideal) goals, career orientations regulate social behavior of a person, give a possibility to take a decision in the choice situation, guide and correct the process of goal-setting».

Three components are identified in the author's model of I.G. Prokopenko (2011): motivation and values, assessment orientation (including both the specific features of self-consciousness – self-estimate of a person – and the level of professional competence), an emotional-volitional one. The authors shift the locus of attention from the cognitive and goal sphere to the sphere «I-conception» of a career subject. The following items are considered as significant conditions of the career readiness formation: a stable orientation of a student's personality to successful professional activity; the formation of a need for career growth; the formation of a subject's «I-image» readiness for career growth and others.

M.A. Plotnikov's (2009) model is based on the methodology of the acmeological approach. Viewing a career first of all in the light of a specialist's self-realization the author highlights four components of career readiness: motivational, cognitive, activity-based and emotional. The cognitive component is treated broadly since it comprises both meaning orientations of a subject and cognitive strategies themselves in the field of professional activity and career growth. The diagnostics of these specific features is built by means of exploring.

We need to emphasize that the majority of domestic researches the cognitive component of career readiness is studied with the help of the technique «Career Orientation Inventory» by E.G. Sheine (1990) presented in a Russian version by the questionnaires «Career Anchors» by V.A. Chiker (2002) and «Career orientations» by A.A. Zhdanovich (2008). The questionnaire makes it possible to reveal the elements of I-conception of a subject that incorporates his perceptions of his own capacities and goals; key needs and motives; relations and values. Such a tradition, on the one hand, invariably reduces a prognostic potential of the study because it does not take into account cognitive strategies and individual peculiarities of decision taking of a career subject. On the other hand, in the authors' opinion, among them A.A. Zhdanovich (2008), it is career orientations that demonstrate more informatively personal meanings of career self-realization in the chosen professional activity.

Let us summarize the applied results of the studies considered: local empirical surveys show a relatively low career readiness of students at the initial stages of learning (Prokopenko, 2011). At the same time graduates are distinguished by more individualistic characteristics. In particular, N.B. Lisovskaya (2014) with coauthors in their studies provided a graduate's portrait with high career readiness and the factors of its decline were revealed: a normative way of behavior and unawareness of career orientations; materialistic attitudes in the sphere of motivation and needs, personal specific features that impede career successes; insufficient mastery of career technologies. In the latest study of the same research team the leading career orientations were revealed («work stability», «service» and «integration of lifestyles»), personal and regulatory peculiarities (externality in the field of production relations) and specificity of graduates' self-consciousness (weakly expressed professional prospects, the prevalence of educational roles over professional ones) and also the characteristics of a career motivation (an average degree of career intuition development and career stability, a low level of career engagement) of psychologists-teachers, graduates of A.I. Gertsen Russian State Pedagogical University and Novosibirsk State Pedagogical University (Bolotova, 2015; Efimova et. al, 2015; Gnedova et.al, 2015; Kalinina, 2016; Leontev, 2017).

## Results

These empirical results are confirmed with the findings obtained in the course of our study. The conducted comparative analysis based on the monitoring of USU students' career orientations and professional perceptions have shown that in the majority of graduates, many of them have already started their professional activity, the career motive occupies a secondary position in relation to emotionally significant events associated with the personal self-determination. The certainty of career orientations is observed with domination of a characteristic «work place stability». Orientations to the professional competence formation prevail in a subgroup of students with a more formed professional identity – achieved positive identity according to L.B. Shneider (2003). The correlation analysis results of the career orientations interrelation with individual and typological properties and indexes of subjective well-being obtained in the study showed the leading role of the orientation to building a vertical career (according to A.A. Zhdanovich, 2008). Significant correlations bind a vertical career for students – humanities majors to several indexes of subjective well-being at once – self-acceptance, personal growth, a possibility to manage people around control the environment. At the same time this orientation correlates with spontaneity as a free self-assertion, an aspiration for the leadership (the combination of extraversion and a competitive type of behavior), the prevalence of personal terminal values and choice of a prestigious profession.

We can assume that the implementation of the subjective and activity approach in domestic studies of career readiness makes it possible to substantiate the determinants of a graduate's career achievements. In prospect it is possible to speak about the activity subject's model of moving in the poly-variant space of a career based on understanding individual and professionally important goals and values, specific features of personal and professional strategies of the subject's activism in view of the revealed structural components, factors and conditions of forming career readiness.

In overseas tradition career readiness is understood from the point of view of the approach which is nearer to the competence one. The point is about knowledge, skills and capacities of career advancement. For example, in the framework of the so-called «Meaningful Learning» - D. Conley's model popular in the US institutions of higher education can be presented.

D. Conley designed four component model of career readiness which is the result of more than 18 years of research conducted under the aegis of Oregon University, the National Center for Education Improvement (EPIC) and other educational institutions. Conley thinks it is insufficient to use the test approach only to the assessment of knowledge and individual qualities of students and turns attention to the possibility of a more flexible marking system of a graduate's realization of his career potential with a prognostic result. Career readiness is understood by the author as mastery of key knowledge of content and key skills and learning techniques in such a way that will enable one to start the investigation/development of one's own career path. Thus this is a certain level of training required for applying for admission and successful – without subsequent rehabilitation – going through the learning that enables students to realize their career path and development potential).

Literally D. Conley's (2012) model can be translated as «The Four Keys to College and Career Readiness». These «keys» of the future career success are designated quite laconically by the author: «Think», «Know», «Go», «Act». Let us consider each component in every detail (figure 1).

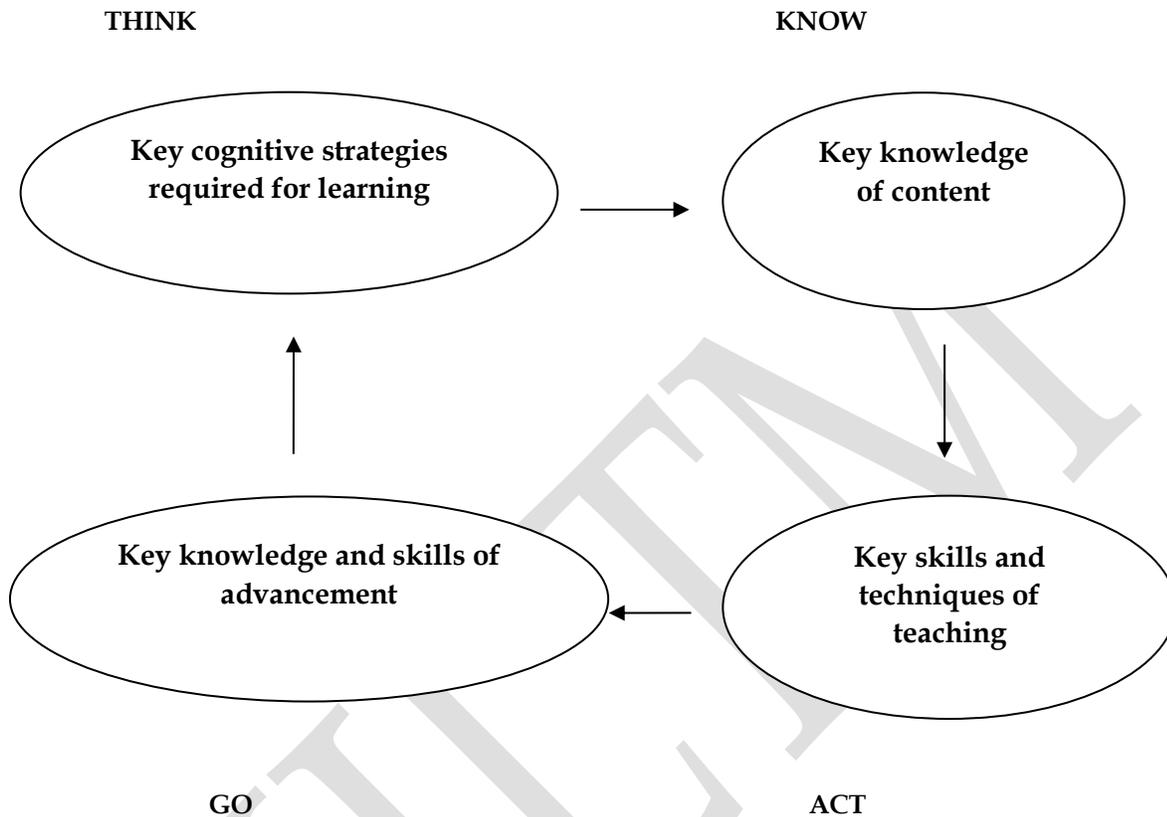


Figure 1. D. Conley's model of career readiness

We would like to point out that «Key knowledge of content» comprises not only professional knowledge but also knowledge of what career opportunities exist in this area and also a perceived value of this knowledge.

«Key skills and teaching techniques» incorporate two categories of knowledge: a student's knowledge of the way how to organize his own learning and specific methods, for example, time management.

«Key knowledge and skills advancement» are privileged very frequently and not equally accessible to students: for example, the representatives of the family dynasties –for instance, from renowned families of doctors, militaries, teachers – are more informed about career opportunities in the chosen field.

The author also lists skills (soft skills) that enable one to build the strategy of one's own career; he defines self-management as an important category that incorporates specific features of behavior and attitudes which allow a graduate to take responsibility for his actions and to become more active. The so-called «meta-strategies» contribute to the movement in the direction of self-management and they provide

involvement in a wider context of activity and environment as well as effective goal-setting (Bolotova et. al, 2015; Ivleva et. al, 2014; Kalinina et. al, 2016; Ivleva et. al, 2016; Masalimova et. al, 2016; Mitin, 2016; Ovsyanik et. al, 2016; Salakhova et. al, 2017; Vasyakin et. al, 2017).

It is important to note that D. Conley (2012) believes fair to consider the measure of responsibility of a higher education institution itself for shaping up its graduates' career readiness. What is meant here is the supplementation of formal education with courses that develop skills of career goal setting and strategic planning. From here the concept of «success» is treated as the completion of main courses with a corresponding certificate and further career movement to new results.

A positive moment, in our view, is the attempt of adapting a number of foreign theories on the Russian sample. In particular, the objective of adapting A. Hirschi and D. Lage's (2007) model was set in research undertaken by N.B. Lisovskaya (2014) with co-authors nominated in the «Psychological Gazette». This six-phase model of career decision making, to the authors' mind, enables one to carry out an instant diagnostics of career decision stages and their psychological content (Salakhova et. al, 2016; Vasyakin et. al, 2015; Mitin, 2014; Masalimova et. al, 2014; Lipatova et. al, 2015; Kalinina et. al, 2017; Bolotova et. al, 2013).

### Conclusion.

Thus the variation of approaches helps to identify the major views on the problem of a cognitive component of the career readiness: assessment mechanisms and mechanisms of decision making; active goal setting; world view components and self-consciousness of the subject of activity. The integration of overseas experience in the field of applied methods of studying and developing the graduates' career readiness is a new tendency.

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## University As Center Of Regional Social-Economic And Scientific-Innovative Development

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### Abstract

The paper is devoted to the study of Russian universities' potential as centers of socio-economic and scientific-innovative development of regions. On the basis of the complex methodology (structural-functional approach, neo-institutionalism, system approach, etc.) the paper substantiates the University concept as a socio-economic system of innovative type. The author concludes that in modern conditions the role of the University as a center of socio-economic and scientific-innovative development in the regional environment is characterized by continuity of institutional mechanisms to support fundamental achievements and cooperation in the innovative development of the region in order to improve economic efficiency. Important directions of University activities in the system of regional development are the implementation of programs to reduce tensions in the labor market and support innovative segments of the economy.

**Keywords:** university, social and economic development, scientific and innovative activity, region, personnel potential.

### Introduction

In modern conditions, the research of Russian universities' potential as centers of socio-economic and scientific-innovative development of the regions becomes undoubtedly relevant one. The fact that Russian science is losing its influential position in the global scientific community, that Russian universities are not competitive in the provision of educational services, is seen only as an external statement of the fact (Kvon et al., 2017). In reality, the processes of changing the value space of participants in the educational process, differentiation in relation to the value of science, scientific activity, and scientific career are observed. The danger of socio-values disorientation of participants in the global innovation process lies in the fact that, when they find it difficult to identify the peculiarities of true and false innovation, they are reduced to the ability to promote the first and block the second one.

The strategy of innovative development of the Russian Federation until 2020 contains the provision that the ability to respond to the challenges and threats facing Russia in the field of innovative development and the defining of goals, priorities and instruments of state innovation policy depend on long-term benchmarks for the development of innovative actors, on the financing of the sector in basic and applied science, support for the commercialization of developments.

In current conditions, the use of the intellectual potential of Russian society is becoming increasingly important, which is associated with overcoming the gap between Russian science and higher education and the requirements of the post-industrial society and the post-industrial economy as a knowledge economy. Stressing that significant efforts are aimed at stimulating research activities and innovative development in higher education (innovative programs of Russian universities), one should note that the emphasis is done on the fact that the implementation of national research universities' new model, including the creation of an innovative infrastructure and development of research activities is promising, but not final stage in the transition of universities to the innovation activity.

Barriers to the implementation of innovation policy are the ineffectiveness of public spending, the gap in cooperation between universities, the aging of the teaching staff, and the isolation of the University system from the real economy. One can state that an equally important problem is the lack of demand in the University system for innovation activity, and the lack of interest in expanding the range of influence on innovative development, especially in the regional space. All these problems are related to the fact that the world University system is experiencing problems related to education and training, management of academic institutions, the use of technology and quality assurance of higher education (Formation of a knowledge-based society, 2003).

As for the Russian conditions, taking into account the urgency of the problem to reduce the backlog of Russia in technological development as a condition to increase the competitiveness of the Russian economy and overcome the technological dependence on imports and increase the prestige and attractiveness of Russian higher education, the study of the University formation and development as a socio-economic system of an innovative type is of big scientific and practical interest.

### **Research Methodology**

In the framework of the objectives of the study the development of adequate theoretical and methodological tools is relevant. In the framework of this study, it is necessary to use the structural and functional approach presented in The fundamental works of T. Parsons and N. Smelser (1956), within the framework of which the feedback construct between different subsystems of Russian society, in particular, institutions of national culture, politics, Economics and management was analyzed. Thus, the University system is traditionally considered from the point of view of structural and functional approach, description of the University system as a mechanism of social mobility, professional socialization, and differentiation by professional profile. In this direction, significant results have been achieved, indicating that integration/disintegration processes are observed in Russian higher education. Integration of higher education is characterized by transition to the model of commercialization, of introduction of new educational standards, connection to the world market of educational services. Disintegration makes destructions by the educational environment's inequality strengthening, divides universities into elite and mass ones, and lengthens the distance between the training of specialists and their demand in the labor market (Vodenko et al., 2016).

Neo-institutional approach describes the University as a social institution that includes formal and informal norms of functioning, which is associated with the implementation of both explicit and implicit (latent) functions. The neo-institutional approach emphasizes the difference between open and closed access to higher education, which is manifested in the fact that with open access universities have a sufficient degree of autonomy in academic and economic activities. With private access, the dominant state regulation of University activities is determined by the status and hierarchy of universities, a system

of client practices that combine elements of informal and contractual organizations (North, Wallis & Weingast, 2011).

The principal methodological role in the study is assigned to the institutional "X, Y - theory" by S.G. Kirdina (2014), which is a kind of neo-institutionalism. This theory allows us to make a system analysis of the cultural and ideological foundations and determinants of socio-economic and scientific innovation in Russia through the prism of mutually complementary leading institutional (X, Y) matrices interacting in the configuration of "dominance-complementarity". These matrices have the qualities of "super-formation" and "camouflage" abilities that allow them to maintain their (civilization) properties at different historical stages of development (including the present) and explicate to the Russian reality (Kirdina, 2014).

The analysis of the presented problems is associated with the identification of the University parameters as a system of innovative type and, in this sense, the structural-functional and neo-institutional approaches, describing the stable state of the University system, are "vague" in the analysis of new forms' formation of universities' organization, transformation of the structure, social and economic changes in the field of scientific and teaching activities. The proposed understanding of the University as a socio-economic system, in general, is based on a system approach, using the inherent in the Russian and foreign sociological thought understanding of the system as a set of educational technologies, relations within the University and the system of formal and informal norms that ensure the reproduction and stability of University activities.

The system approach positions are embodied in the concept of organization of A.I. Prigozhin (1995) and found concrete embodiment in the studies of F.E. Sheregi, N.M. Dmitriev, A.L. Arefiev (2002). Significant results in the context of the socio-economic approach, like the projection of consistency principle in socio-economic development of Russian higher education are contained in the work of the team led by D.L. Konstantinovskiy (New meanings in the educational strategies of youth, 2015). In particular, it is revealed that the construction of the higher education system is given by the organization of economy and society, orientation to the perspective needs dictated by technological innovations and the need for creative and initiative people as a resource of economic and social development.

Despite the fact that the scientification of culture leads to the dominance of instrumental rationality at all levels of social subsystems, scientific and innovative activity is regulated by the contents of ethical, symbolic and aesthetic order. Therefore, a full analysis of the cultural and ideological determinants of scientific and innovative development in the Russian society led to the need for the implementation of the research discourse of a cultural sociological approach, received the foundation in the concept of A. John (2013).

However, the author does not go beyond the understanding of the University as a formal institution, while the social dynamics in the field of higher education focuses on the understanding of the University as an innovative type of system, which makes it necessary to study the interrelated process of autonomy of educational institutions and changes in the economic structure of Russian society. It is this process that determines how the tendency to form an innovation-type system is manifested, what innovations are produced in the University, how the idea of economic efficiency of scientific research in the University environment can be realized. All this determines the vector of the institutional stage at which the goals of the University activities, interests, social relations, role distribution, conversion of the educational resource into innovative development focused on the development and implementation of technological

and social changes that create a new quality of higher education and the formation of the connecting function between the socio-economic sphere of society and the system of higher education.

### Results

In the socio-economic system, the activity of the doer is subjected to the educational process; its connections are built on the logic of economic organization. However, this does not eliminate the social nature of intra-University relations, as the emerging complex includes scientific and technical (material) environment, professional knowledge and skills, research process. Therefore, the understanding of the University as a socio-economic system is not reduced to the economic function. First, in the higher education system requirements for intellectual and professional moral quality of the teaching staff of the faculty has been developed. Secondly, there is an academic tradition, which is based on the understanding of the University as an integrator of culture, the integrity of the educational process associated with ideals, values, means and opportunities (Dolzhenko, 1995). Without exaggerating this fact, one can state that the transition to an innovative system is possible on the basis of new educational values, the construction of a tradition of pragmatism.

Thirdly, it is necessary to understand that the consumer of higher education is not only the state, but also the business community, which is interested in training competitive specialists and in offering universities justified innovation by the economic and financial criterion. The problem is that the mechanisms of interaction between the University and the state in the context of criteria of socio-organizational effectiveness of universities are not well established. It should be noted that, despite the fundamental nature of the stated goal of University innovation activity, it is necessary to understand whether the stated position of the qualitative education and the development of science, technique and technology and the introduction of innovation meets internal changes in the University structure.

In this regard, one can refer to the effect of "intellectual colonialism" and usage of the model "the reproduction of backwardness" under the guise of University life technologization, which is dominated by a strengthening of bureaucratic paperwork, but weak is the impact of the professional expert community on policy changes in the University system (Intellectual colonialism in the global educational market, 2017). There is a problem of using the acquired social and reputation capital, as within the framework of the implemented standards and criteria universities that have an academic tradition, lose advantage with universities that are not focused on the production of knowledge and training of students, but on the database of information technologies, acting under the "flag" of proactive and individualized learning.

In the framework of cooperation with the business environment, it is necessary to take into account that the desire to obtain short-term profits can lead to the threat of the University to become an agent of commercialization; the mechanism for coordinating the interests of the University and business is extremely slow and prohibitively complex. So far, there are no schemes of integration and communication between universities and the business community, besides, Russian huge corporations work on their own image and corporate culture, creating their own corporate universities (Gazprom) or investing resources in fashion projects (SKOLKOVO).

Taking into account that the majority of graduates focus on the real opportunity to work in the environment of small and medium-sized businesses, it can be stated that there is an obstacle in the form of demand for specialists of pragmatic level and, on the other hand, weak attention to research and development of the University, which is of fundamental importance. The desire for profitability

determines the promotion of technological and organizational innovations, which are created purposefully to expand the possibilities of preserving the achieved positions or active participation in mutually beneficial economic projects.

However, the Russian higher education system, despite the decentralization of control, suffer from weakening of the ties between fundamental science and education, from limited funding, which leads to the selection of the most promising programs, but it is not justified to the full (Dynamics of the social structure and the transformation of public consciousness, 1998). This judgment has not lost relevance and decades later, as in the 90s of the twentieth century there was a tendency to reduce the financing of higher education, and in the current situation there is an increase in social problems of universities, the process of aging and outflow of human resources. We are talking about the fact that to create a working model of the University as a socio-economic system, it is necessary to take into account the high level of international competition, it is necessary to form an optimal University environment for scientists working at a productive scientific age.

Noting that the policies adopted in the field of higher education seek to transfer scientific research from the science sector to higher education, the positive and negative effects of such decisions should be taken into account. Positive ones are related to the constructive idea of integrating science and education by the foreign University model. Negative ones are with the inability to create in a short-term the unique complexes and complex installations that are in the academic sector. At the same time, the reduction of personnel in the academic sector is not compensated by the growth of qualified research segment in higher education. Universities are replenished from the academic environment for reasons of compatibility of work or career aspirations, which does not change the current configuration for the implementation of educational functions by universities. In connection with this factor, it is premature to state that the Russian universities have formed an innovative human potential. The analysis of innovation sphere's state contained in the strategy of innovative development of the Russian Federation until 2020 indicates that, despite the adoption of measures to modernize the economy on the basis of technological innovations, stimulating research activities and innovative development in higher education is selective, which is based on a variety of forms of research areas, but the reliance on regional resources is poorly visible.

In other words, it is not taken into account the fact that the University as a socio-economic system of innovative development carries out practical activities in the unity of external optimal factors and restructuring of the intra-University environment. Support of a number of Russian universities in their activities to stimulate research and cooperation with enterprises is a positive trend, it strengthens the competitive basis in the desire of universities to earn financial and reputation capital.

The study of the national model of management of scientific and innovative activity in the Russian society required the analysis of the historical experience of Russia, which contributed to the creation of modern science Institute in the country, which has become a fundamental resource for the subsequent modernization. In accordance with the theoretical scheme of cultural sociology proposed by A. John cultural factors were identified that promote or, on the contrary, slow the growth of scientific and innovative activity, which can be reduced to the state of civil society and, consequently, the level of initiative of its members (John, 2013). The analysis of historical experience has shown that the weakening of the expansion in civil society and its institutions leads to a slowdown in the pace of scientific and innovative development provided the existence of the entire system within the framework of capitalist production. Cultural and ideological determinants characteristic of Russian society and associated with

its historical memory are able to form the attitudes of public consciousness and influence the processes of scientific and innovative development. Prospects for scientific and innovative development of Russia may be associated with the expansion of civil control and the formation of an innovative image of the country.

Archaization and preservation of national culture for the sake of the policy of ideocratic domination, which opposes the development of civil society institutions, especially against the background of exclusive exploitation of raw materials, can produce the effects of stagnation in the field of production and the introduction of high technologies. Therefore, especially at the micro level, it is necessary to stimulate scientific and innovative development in every possible way by creating regional clusters that allow improving the management of small innovative enterprises and ensuring effective interaction between business, universities and local authorities (Cherkesova et al., 2017).

### Discussion

However, it is obvious that the hierarchy of innovation priorities is not structured, and regional universities may be aloof from the mainstream, as they are not part of the promotion cycle, which includes the selection of developments on the SKOLKOVO model. Taking into account the fact that the practice of inviting specialists with a "global reputation" is not permanent for regional universities, it seems realistic to rely on regional intellectual capital, which can be seen from the positive experience of various universities. In this direction, one can talk about certain successes in strengthening the human resources potential, but outside the organizational and regulatory changes, giving the University the status of an organization (socio-economic system) of an innovative type, it is difficult to anticipate the prospects for the University to enter the level of interregional and global cooperation.

As it was pointed out by Russian researcher I.I. Ivanova (2004), if one agree with the statement that higher education is a strategically important sphere of human activity and is characterized by principled innovation (extension of the autonomy of universities, the introduction of multilevel training of specialists, development of the private education sector) the return is observed to the model of the University as a common good, of the area of state-social partnerships as a consequence of the rejection from the idea of the University transfer into the system of social services (Ivanov, 2004). In this sense, the University, as a socio-economic system, cannot be limited to self-financing, in the organizational aspect the formation of management structures with sufficient professionalism and competence to implement the policy of transition to the socio-economic system of innovative type can be considered relevant one. The closure of the University management system in the implementation of socially-stimulating and socially-developing functions associated with the formation of a multi-level system of University activities, including educational, research, marketing, projective sectors, becomes obvious (Vodenko, Rodionova & Shvachkina, 2017).

In the strategy of innovative development of the Russian Federation until 2020, special attention is paid to the standards of economically developed countries in the framework of establishing cooperation between science and business, increasing the level of commercialization of scientific developments of state academies and universities. In this context, it is important to define the boundaries of commercialization and social activity, social creativity, which is difficult outside the definition of socio-cultural meanings of scientific and innovative activities (Vodenko et al., 2017). The social ethos of the scientist claims to form the organizational culture of the University as a socioeconomic system.

It is also about the fact that to achieve the optimal level of University management within the framework of innovation requires that, when there are alternatives to narrow the range of control or simplify devices of University organization, there is a temptation to create the dominance of the economic structure, controlling the profitability of the University in the implementation of commercial development and establishment of contacts with the best partners. The division of programs of fundamental and innovative developments can be considered an optimum based on experience of foreign research centers, as cutting-edge research are the most important element of the innovation system (Formation of a knowledge-based society, 2003). The University as a socio-economic system cannot be subjected to the administrative procedure of "steadily increasing profitability". This means that the guarantees of organizational, financial and research autonomy are based on the University's ability to determine its own innovation policy within the framework of innovative development's strategy of the Russian Federation until 2020.

It is one thing to link the University to the state order, another – the work of the University with economic partners. It is effective to cooperate with small and medium – sized businesses in the provision of innovative services to improve technological processes and employment of graduates, with corporations and banks in the implementation of strategic innovations that provide technological breakthrough. Naturally, at the regional level, there are difficulties associated with the monopoly of the capital's and foreign universities and investing in the development of science, technology and education in the University needs an open and transparent competition within independent expertise.

The regional feature of the University, as a socio-economic system, is associated with the typology of regional universities according to the innovative criterion and the subjective importance of science and education in regional elites and regional society. Of course, this factor is influenced by the level of confidence in the University as a development factor of domestic science and the national economy. Of course, the differences of expectations between Russian and foreign studies should be taken into account. If environmental problems, new medical and scientific discoveries are priorities abroad, for the Russian regional environment the attitude to higher education as to the socio-economic system is characterized by "working" criteria: introduction of technological and economic innovations that ensure economic growth, employment, improvement of life quality.

Analyzing the formation and prospects of the University, as a socio-economic system of innovation type, it becomes apparent that the formation of new forms and management strategies in higher education is connected with the mechanism of succession of organizational forms in the organization of the University and the formation of an adequate institutionalization of new styles and innovations with the need to develop formal, structural aspects of University management, and to create an institutional formation, which contain a multiplicity of possibilities for the realization of educational, economic, and cognitive functions at a regional University. The University's involvement in the regional economy is a bipolar process: on the one hand, it is the process of the impact of the regional market and economic structures on the activities of the University, on the other - the process of innovative development of regional society and the inclusion of the University in the form of autonomy and integration.

Russian research idea determines the analyzed problematic study in interdisciplinary perspective. Indeed, there is a powerful "economical-centric" direction focused on the transition of the University to the model of "commercialization" and the strategy of innovative development of the Russian Federation until 2020 focuses on "return" of the University system in the context of technological innovations' introduction in the economic development of the country. This is understandable within the framework of the program of social and economic modernization. Defining the tasks of the conceptual justification of

the University as a socio-economic system of innovative type, one can talk about the establishment of the University in this direction as a complex system, whose activities are associated with the approval of generally important rules of the game and the consolidation of mechanisms of social trust. Taking into account that innovative development is connected with creative personality as a subject of social and innovative activity (New ideas in sociology, 2013), it can be stated that the proposed approaches to solving the problem are connected with a variety of forms of University management as a socio-economic system of innovative type (reflexive, diagnostic, projective types of management). There are differences in understanding the stages of formation of the University, the conditions for the implementation of innovation, which can be welcomed in the context of the introduction of a new model of University activities.

It is important for the University at the regional educational level to establish constructive cooperation with the regional labor market, with different business structures of the region, since if the image of the University has a positive effect on regional and national funding, the question of the degree of the University independence to use financial resources, to make additional efforts at the regional level to develop the infrastructure of the University, as well as to reorient the teaching staff to regional social and business practices remains open.

The fact is that in the context of the current socio-economic crisis, the consequences for universities are the increased tensions in the labor market, increased risks of unemployment for graduates, which leads to a reduction in the possibility of adopting their own initiatives, as well as creating barriers to their own innovative development. Since modern technical universities should strive to diversify financial resources to increase the consolidated budget, there is a problem of rational use of financial resources, participation in regional projects that would have a legal and financial guarantee from regional authorities and business structures (Vodenko, Rodionova & Shvachkina, 2017).

Indeed, as the experience of the implementation of universities' innovation activities shows, there is a problem of duplication of problem, closed competition, inconsistencies between the program of University's development and operation of specific activities. In particular, the efforts made to expand the range of services (basic and additional educational services, scientific and technical and development, consulting, rental of equipment, facilities and laboratories) are characterized by the predominance of rental schemes and educational services, while Research and Developments work takes a modest place-form 6-8% of the consolidated budget of the University.

It is important to note here that, although universities can independently determine the sources of financing, there are fairly strict schemes for monitoring financial situations, and universities face difficulties in developing accumulated financial resources. In other words, regional technical universities are determined by the status of obtaining financial resources, and the actual level of satisfaction by the University with the existing performance criteria depends on the rating of the University, which does not include an assessment of the possibility of cooperation with other universities and has no regional coefficient.

In other words, the regional University system operates in a range of limited opportunities associated with the increase of human capital in the regional society, and a significant difference in the assessment of the level of satisfaction with the effectiveness of universities requires changes related to career guidance services, improvement of professional skills, investment attractiveness of the University.

It is characteristic that employers, as customers, noted the lack of required specialists, a limited selection of job seekers and low-skilled level. The dominant place is occupied by low-skilled professionals (44.8% of surveyed employers) (Regional sociology: the problems of consolidating the social space of Russia, 2015).

At the same time, it should be noted that the monitoring system of regional universities contains certain limitations determined by the logic of efforts' concentration. It is understood that regional technical universities still do not retain the reproduction matrix and are interested in maintaining the stability of the teaching staff. This has the effect of narrowing the opportunities for recruitment of new staff, as well as a certain "fear" in the implementation of bold innovative ideas containing uncertain financial results. It should also be emphasized that the higher education system mostly moves on an inertial trajectory, focused on training and retraining of highly qualified human resources according to the "range of specialties", and not on the real needs of the regional labor market.

Taking into account these difficulties, it can be noted that while at the level of cooperation of universities it is possible to talk about achievements in the form of the introduction of criteria unified system for evaluating the activities of the University, as well as inter-university programs, research and retraining of specialists, in the regional context, the positive dynamics of scientific and technical development is poorly provided.

### **Conclusion**

Within the framework of the University concept as a socio-economic system of innovative development, interest in this process cannot be assessed unambiguously. The materials of the study of this problem indicate that it is necessary to find a balance between commercialization and social autonomy of the University. On this way we are talking about strengthening the strategic role of the University in the development of the regional economy and regional society, where the emphasis is shifted from the provision of educational services to the development of research programs aimed at strengthening research and development potential, improvement of information technology, which meets modern needs and improve the quality of higher education.

Important activities of the University in the system of regional development are the implementation of programs that provide for reducing tensions in the labor market, and support for innovative segments of the economy. This contains some contradiction, since the innovative segments of the economy do not form a large number of jobs, but the cumulative effect is achieved due to the fact that new technological chains are formed, that the University system is reoriented to vocational retraining and business-commissioned training. There are also expectations about the level of accessibility and quality of higher technical education. It is also important to note that for technical universities it is very promising participation in the transition from regional and territorial to innovative clusters. Since the main obstacle is the lack of qualified personnel, it is possible to foresee a sufficiently high degree of realization probability of a technical University status as the main factor of cluster policy. If we assume that the second obstacle in the development of the cluster is the low receptivity of economic structures to innovation and insufficient consumer quality, in this direction the technical universities will have a great job.

It is necessary, without copying foreign experience, to take into account the social and humanistic mission of higher education in the regional space and to increase the level of confidence in higher education. It is

important that in the process of the University system transformation, teams of scientists and teachers could actively participate in organizational, regulatory and socio-structural changes.

### Gratitudes

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## On the Relationship between Iranian High School EFL Learners' Reading Comprehension Strategies and Their Majors

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### Abstract

The present study focuses on determining the relationship between Iranian high school EFL learner's reading comprehension strategies and their majors. Seven hundred and Eighty nine Iranian EFL learners from Math, Humanities, Vocational, Technical, and Natural science majors from grade two from males and females from different cities were selected through non-probability sampling (accidental sampling) to participate in the study. A reading strategy inventory and Classroom Observation Coding Protocol as instruments were used to collect the required data. The data were analyzed through descriptive statistics to determine the frequency of strategies employed by the learners. Kruskal-wallis and Mann-Whitney U test was also employed to find out how the use of strategies varied according to students' majors. The findings of the study revealed that there is no significant difference in the use of overall reading comprehension strategies between different majors. Besides, it showed the preferences of using problem solving strategies in Math and Technical and support strategies in Vocational and Natural science students.

**Key words:** Reading strategy use; Reading comprehension; Iranian EF; learners

### I. Introduction

#### A. Background and purpose of the study

The vast application of learning strategies- as the special thoughts or behaviors that learners use in order to comprehend, learn and retain new information- has been the domain of many researches in English language teaching and learning contexts (Oxford, 1990). Teachers in various contexts of teaching should base their approach on students' respective psychological characteristics, their own language knowledge, teaching requirements, design, content, and teaching and learning strategies. They seek the best process for each student in the most appropriate environment for learning English. Researcher, from his experiences, realized that high school students need to be investigated about how to approach language learning at different majors; also, has observed the students who cannot achieve good results. Frustration was a constant reality as the researcher witnessed students' infelicity in English learning. He was at a loss himself, not knowing which learning strategies could best help his students. The American psychologist Bloom (1971) noted many of the students in the learning can achieve excellent results by helping them in mastery Learning. Rubin (1981) stated a classification of strategies that directly affect learning. The researcher in this study is interested in finding different reading comprehension strategies that students in different majors apply and may be helpful for the students who cannot obtain the acceptable and desirable Language achievement.

### *B. Statement of the problem*

By considering the differences in learning between an ESL and an EFL context in an ELL situation, investigating learning strategy and showing learners how to take control of and be more responsible for their own learning is crucial.

Some empirical studies have been carried out on reading strategies and their relationships to successful and unsuccessful L2 reading (Hosenfeld, 1977; Knight, Pardon, & Waxman, 1985; Jimenez, Garcia, & Pearson, 1995). Prior studies (Hsu & Huang, 2004; Kung, 2003; Lin, 2001; Su, 2003) focused on Taiwanese elementary school EFL students' language learning strategies.

Through such studies, it is hoped that language learning strategies will play a key role in creating more efficient and successful learning experiences (Zimmermann & Hutchins, 2003).

Kaur and Che Lah (1999) observed in Malaysia in a study that it is essential for students to learn and train themselves to become independent learners.

Khosravi (2000) made an attempt to investigate the effect of scanning and skimming, as two reading strategies, on Iranian EFL students' reading rate and reading comprehension.

Shokrpour and Fotovatian (2009) conducted an experimental study to determine the effects of consciousness-raising of metacognitive strategies on a group of Iranian EFL students' reading comprehension that showed a significant improvement in reading comprehension at the end of the treatment period.

Taking a look at studies reported above, one can come to the conclusion that the area of reading comprehension strategy still requires further researches, especially in an EFL context such as Iran and the present study intends to explore the issue more deeply by addressing a number of variables such as applied reading comprehension strategies and the extension of the range of strategies used by learners in different majors.

### *C. Significance of the study*

A school wide commitment to reading strategies in all content areas has had a positive impact on student achievement at Iranian High School.

By all accounts, Vocational High School students in Iran, Gaen, are students in trouble. Achievement scores were the lowest in the city and among the lowest in the province. Most of the managements suggested that we should not expect more from our students. The teachers did expect more; however, every teacher at our schools had been working hard to meet students' needs but our students were not achieving. Then, equally important to the commitment from teachers towards students was the researcher commitment, the researcher worked on a study that centers on reading comprehension learning strategies in different majors and the results would seem to support teachers' efforts in their profession.

In the described study, the researcher tried to identify at least some of the strategies that might be causally implicated in reading comprehension ability and which; therefore, may be fruitfully trained. Some individuals benefit more from in some strategies rather than others. Shang (2010) investigation on the link between reading strategy use and perceived self-efficacy on their English reading comprehension revealed a significant positive relationship between the use of reading strategies and perceptions of self-

efficacy. The present study enjoys significance in that it can provide an insight to the use of reading comprehension strategies and preferences in different majors. In fact, reading comprehension strategies, due to its complexity, has rarely been conducted in an EFL context such as Iran.

#### *D. Research question*

Accordingly, this study aimed at finding answers to the following research question:

Q1. Is there any significant relationship between reading comprehension strategies used by Iranian EFL learners and their majors in high school?

#### *E. Research hypothesis*

To come up with reasonable results on the basis of the aforementioned research question, the following null hypothesis was proposed:

H01. Iranian High school EFL learners in different majors do not use similar reading comprehension strategies.

#### *F. (De) Limitations of the study*

Like any other researches, some inevitable limitations, which might raise new questions for further researches in the same field in the future, would be imposed on. The first was related to selection technique of the sample and its time limitation. The second, variables such as gender, age and personal variables were not taken into account. Moreover, by taking great care in sampling, but naturally one can never be totally certain that the sample matches the target population on every variable of interest.

## II. REVIEW OF LITERATURE

### *A. Introduction*

In the review literature, the researcher would investigate literature related to general areas that were directly relevant to the major research question such as learning strategies, reading process, reading comprehension strategies, and different high school majors.

The researcher has got valuable information during the reviewing current literature and researches related to the teaching of reading comprehension strategies. This helped the researcher to use this information to design his research project and to understand the data emerged from it.

### *B. Learning Strategies*

Learning has been defined as "acquiring or getting of knowledge of a subject or a skill by study, experience, or instruction (Brown, 1941, p.7). The three learning theories of behaviorism, cognitivism, and constructivism have been influencing education and guiding instructional practice since the 1800's (Baruque & Melo, 2004). Strategy has been defined based on Merriam-Webster dictionary as an adaptation or complex of adaptations (as of behavior, metabolism, or structure) that serves or appears to serve an important function in achieving evolutionary success. Strategies are conscious and generally effortful; also, purposeful. A learning strategy is a person's approach to learning and using information. Learning strategy instruction focuses on making the students more active learners by teaching them how to learn and how to use what they have learned to solve problems and be successful. For example, readers may use strategies to become efficient at monitoring their level of comprehension, or to process the meaning of a particular sentence. According to O'Malley et al. (1985), "language learning strategies

have been broadly defined as any set of operations or steps used by a learner that will facilitate the acquisition, storage, retrieval, or use of information” (p.23). In Oxford’s (1990) study, she synthesized prior study results and came up with a language learning strategy system with categories including memory strategies, cognitive strategies, compensation strategies, metacognitive strategies, affective strategies, and social strategies. Language learning strategies(LLS) are particularly important for language learning as they are tools for active and self-directed involvement, which is essential for developing autonomous learning, (Venden, 2002).

### *C. The Reading Process*

There are many theories about how students learn to read and the teaching of reading. Reading in the most simplistic manner is the interaction between the text and the reader (Rumelhart, 1977). This interaction is affected by different factors such as: the readers’ own experience with their community, school and cultural experience and the extend these relate to the text, as well as their individual personality, the combination of these reader factors with textual features (structures, syntax, grammar and vocabulary), and the correspondence between the reader and the text. Burns, Roe, and Ross (1992) in their studies referred to the reading as a life skill that by combining nine aspects of the reading process – sensory, perceptual, sequential, experiential, thinking, learning, associational, affective, and constructive- the reading process becomes facilitated. Bouwer (2000) stated that the sensory, perceptual, and sequential aspects depict the decoding process of reading and the six remaining aspects characterize the comprehension process of reading. Goodman (1996) described reading processing strategies by focus on the use of three Cueing Systems (Phonological and visual/orthographic information, Language structure, Meaning) and use of Self-Correction during figuring out a text’s message.

### *D. Reading comprehension strategies*

Ontario Ministry of Education (2005a), Farstrup (2006), and Cunningham & Allington (2007) indicated the importance of learning comprehension strategies by stating that many students who were good readers in the primary grades will nonetheless struggle to read in the junior grades if they don’t learn the comprehension strategies to deal with the more complex text formats, text features and genres they experience. One factor that distinguishes successful from less successful readers is the use of reading strategies, particularly when comprehension problems are encountered (Brown, 1982; Long, Oppy, & Seely, 1994; Oakhill, 1984; Oakhill & Yuill, 1996). Low-achieving adolescent readers improve their comprehension performance when they learn to apply strategies.

The National Reading Panel (2000) identified six key reading comprehension strategies in order to fortify children’s reading abilities namely: monitoring comprehension, using graphic organizers, generating questions, answering questions, recognizing story structure, and summarizing.

Moreover, other strategies such as predicting, inferring, making connections and using text-structure clues to identify organizational patterns in text to increase comprehension have been cited (Harvey & Goudvis, 2007; Keene & Zimmerman, 1997; Pearson & Duke, 2002).

Myriad factors affecting the interaction between the reader and the text have been identified. Fountas & Pinnell (2006) stated reading as a thinking process, occurring something to the reader as a person and comprehending a text that is closely related to his life. Rosenblatt’s (1993) theory of interactive process and The Ministry of Education for Ontario (2004) and other studies emphasize the application of a variety of strategies for proficiency.

Schumm (2006) describes strategies as processes that “are controlled by the reader, are metacognitive, are intentional, are flexible, and emphasize reasoning” (p. 229). Afflerbach, Pearson, and Paris (2008) argued that the strategies are deliberate, goal-directed attempts to control and modify the reader’s attempts to decode text, understand words and construct meanings. Schumm(2006) enumerated Phonemic Awareness, Phonics, Fluency, Vocabulary, and Comprehension as the components of Reading. Lipson (2007) listed comprehension Strategies as monitoring understanding, making connections( readers make connections to what they already know, their personal experiences, their knowledge of the world, and the other texts they have read or experienced), asking questions, summarizing, drawing Inferences, synthesizing, determining importance.

Rosenblatt's (1993) declaration of reading as the transaction collides head on with that of Lipson’s making connections and David Nunan,(1989) who sustains the schemata, which means background knowledge, enabling learners to recreate and reconstruct the text’s meaning. Pourhoseein Gilakjani and Ahmadi (2011) emphasize d the importance of schemata in reading as the process that readers combine their own background knowledge with the information in a text to comprehend that text. All readers carry different schemata (background information). So activating the learners’ schemata is an important concept in EFL reading to help the learners adjust the pattern of their own experiences and background.

There are strategies that are used before, during, and after the reading process (e.g., Saricoban, 2002; Schmitt, 1990).

Although it is clear that preparing to read takes place before reading, it could be argued that organizing, restructuring, and synthesizing could take place while reading as well as after reading. Among various types of learning strategies, reading comprehension strategies have long been recognized by researchers of second/foreign language reading (Brantmeier, 2002; Janzen, 1996; and Slataci & Akyel, 2002). Reading strategies defined by some theorists refer to as mental operations used by readers when they read a text and try to understand it effectively (Barnett, 1988). Actually, reading strategies show how readers understand a task, what textual cues they care for, how they apprehend what they read, and what they do when they do not understand. Reading strategies vary from simple fix-up strategies such as simply rereading difficult segments and guessing the meaning of an unknown word from context, to more comprehensive strategies such as summarizing and relating what is being read to the reader's background knowledge. Generally, researchers claim that strategy use is different in more and less proficient readers, in that they use the strategies in different ways (Carrell, 1989). In fact, by reading comprehension strategies we can separate the passive, unskilled reader from the active reader in which skilled readers don't just read, they interact with the text. Yau (2005) in his study found that proficient readers employ more sophisticated approaches to reading than less-proficient readers. For instance, in his study the skilled reader employed strategies of summarizing, inference, and synthesizing during and after reading, while the less skilled reader applied bridging inferences, paraphrasing and repetition. In a program of adolescent literacy instruction Moore and his colleagues (1999, P. 5) identified and outlined the following strategies that can be used across a broad range of texts including: activating their prior knowledge of the topic and text, predicting and questioning themselves about what they read, making connections to their lives and other texts and to their expanding worlds, summarizing key ideas, synthesizing information from various sources, identifying, understanding, and remembering key vocabulary, and many other factors. Sheorey and Mokhtari (2001) refer to metacognitive reading strategies as three sub categories: Global, Problem solving and Support strategies. Global strategies are intentional and carefully planned by learners to monitor their reading, such as having a purpose in mind, previewing the text, checking how text content fits its purpose, noting text characteristics like length and

organization, and predicting or guessing the text's meaning. Problem-solving strategies are the actions that readers employ while they are working directly with the text, especially when the text becomes difficult; these strategies include guessing the meaning from unknown words, adjusting one's reading rate, visualizing the information read, resolving conflicting information, and rereading the text to improve comprehension. Support strategies are what readers use to aid comprehension, such as using a dictionary, taking notes, highlighting textual information, or translating from one's mother tongue to the target language. Several studies have been investigated the relation between reading comprehension strategies and students achievement. The link between reading comprehension strategies and student achievement and their majors is under questioning.

### *E. High school majors*

Education in Iran is highly centralized and is divided into Kindergarten through 12th Grade [education](#) and [higher education](#). K-12 education is supervised by the [Ministry of Education](#) and higher education is under supervision of [Ministry of Science and Technology](#). There are four stages in Iran's educational system namely; [Primary school](#) (Dabestân), guidance school (Râhnamâyi), [High school](#) (Dabirestân), and pre-university (Peeshdaneshgahe). [High school](#) (Dabirestân), for which the last three years is not obligatory and it is divided between theoretical, vocational/technical and manual, each program with its own specialties. The requirement to enter into higher education is to have a [High school diploma](#), and finally pass the national university entrance examination, [Iranian University Entrance Exam](#) (Konkur).

The process of choosing a major starts in 9th grades as students use different interest inventories to identify what they enjoy doing and may want to do in future. During the first grade of High school, students will do more interest inventories by their advisors' help and with parental ideas. High school education is divided into two main branches namely, academic/general and technical/vocational. The choice of either branch is up to pupils themselves. Choosing a major is required by the Ministry of Education and Training legislation; moreover, completing a major is required to graduate from high school. Additionally, students may change majors at various points throughout the school year.

There are at least six main majors including: Math -Physics, Natural Sciences, Humanities, vocational, technical, and theology available for students in Iran. Majors such as Mechanic, Computer, Design, Agriculture, Accounting, Family management, Wood Industrial, Topography, Found, and so on are in the vocational-technical services cluster.

Although many studies have been done on the reading comprehension instruction, few studies have been done on students' application of different reading comprehension strategies, and their majors. The present study will investigate whether there is a relationship between learners' reading comprehension strategies, and their majors.

## III. METHODOLOGY

### *A. Participants*

To collect the required data in order to answer the research questions five groups of EFL High school students from different parts of the country at least from seven provinces from public school were selected. The sample was accidental sampling and intact groups. The participants were from Gorgan, Ahvaz, Nishabour, Mashhad, Gonabad, Zabol, Gaen, Birjand , and Tehran. The total numbers of participants were more than 789 EFL students. Selected groups were from different majors (Math - Physics, Natural Sciences, Humanities, vocational, and technical) in grade two. They were both male and female. They ranged in age from 16 to 17 and had already studied English for 4 years at school. All of these subjects had the same training programs in English.

The responsive participants were 133students from Technical, Vocational with 172 students, Math with 132, Humanities with 206 students, and Natural Science with 146 students.

### ***B. Instrumentation***

In this research, both qualitative, student's observation, and quantitative data (student questionnaire on reading comprehension strategies were used in order to provide the necessary data (See Appendix A&B).

Reading comprehension strategy Use Survey adapted from Cohen, Oxford and Chi (2005) was used.

The questionnaire contained thirty statements about the various techniques students' use when reading materials in English. The items were divided into sections, each related to three different types of strategies: Global strategies: (Items 1, 3, 4, 6, 8, 12, 15, 17, 20, 21, 23, 24, 27), Problem solving strategies: Items (7, 9, 11, 14, 16, 19, 25, 28), and Support strategies: Items (2, 5, 10, 13, 18, 22, 26, 29, 30). They were asked to mark the choices in twenty minutes.

### ***C. Study Design***

In order to address research questions the study was designed in a correlation and factorial way that would be appropriate for providing the desired information. Participants were not chosen by simple random sampling, but rather as intact groups and accidental sampling. The study was based on the Language Strategy Use Inventory suggested by Cohen, Oxford and Chi (2005).

### ***D. Procedure***

In this study the researcher compared five groups of high school EFL students including 789 learners in grade two to determine the related reading comprehension strategies in different majors. Some instructions were sent in print for those teachers that could help the researcher in distributing and gathering questionnaires in other cities.

By the way the questionnaire for the students was translated in Persian to be more understandable and respondents could give more genuinely responses. The translated questionnaire was piloted in order of its content validation. The researcher got revisory views of his MA colleagues and Persian experts.

It should be mentioned that the students were given enough time to complete all the questions. After that the delivered filled questionnaires were analyzed for the purpose of data analysis, to identify the relationship between different reading comprehension strategies applied by high school students in different majors.

## **IV. ANALYSIS OF THE RESULTS**

To test the proposed research question, the quantitative data were analyzed through applying descriptive statistics, and inferential statistics. All of the data described in the previous subsections were first organized into raw data files. The researcher first calculated the participants' views on each statement in the survey and participants responses were classified based on their majors. The calculation of the data was done by the use of SPSS software.

A. Descriptive Statistics

The purpose of this phase of the analysis was to obtain descriptive statistics for the participants' scores on Reading comprehension strategies, and majors. The data were first organized into profiles of raw scores for conducting statistical analyses. The results are shown in Tables 1-5 which lists the mean, standard error of mean, standard deviation (SD) of the participants' majors.

Table1.Descriptive statistics of participants from different majors

	Frequency	Percent	Valid Percent	Cumulative Percent
Technical	133	16.9	16.9	16.9
Vocational	172	21.8	21.8	38.7
Math	132	16.7	16.7	55.4
Humanities	206	26.1	26.1	81.5
Natural Science	146	18.5	18.5	100.0
Total	789	100.0	100.0	

Based on table 1 (16.9%) participants were from Technical students(21.8%) from Vocational, (16.7%) Math students,(26.1%) from Humanities, and Natural students with (18.5%).

B. Descriptive Data of Students' Reading Comprehension Strategies Use in Different Majors

The Reading comprehension strategy Use Survey has been quantified by assigning points to each of the responses. The obtained results have been shown in table 2.

Table 2 Descriptive Data of Students' Reading Comprehension Strategies Use in Different Majors

	Mean	Std. Error of Mean	Std. Deviation	Minimum	Maximum
Math	60.4015	2.27983	26.19331	30.00	<b>119.00</b>
Natural Science	59.2890	1.99545	26.24610	30.00	<b>115.00</b>
Vocational	64.2093	2.14894	28.18303	29.00	<b>119.00</b>
Technical	64.9774	2.41585	27.86098	11.00	<b>120.00</b>
Humanities	61.8689	1.82198	26.15036	11.00	<b>117.00</b>

The results exhibit in table 2 provides the mean values of five groups (60.40, 59.28, 64.20, 64.97, and 61.86) respectively. The results revealed that the students of five majors did not differ significantly in their use of reading comprehension strategies. For more information see appendix C.

A series of observations was also made by the researcher on the students' employing strategies in different majors. In order to describe the data from Classroom observation Coding protocol for different majors, the researcher labeled 1 for Humanities, 2 for Math, 3 for Natural science, 4 for technical, and 5 for vocational. Then obtained data that were from ten class observation were categorized in table 3.

Table 3 Frequencies of Classroom Observation Coding Protocol on Reading Comprehension Strategies in Different Majors

	Majors	Frequency	Percent	Valid Percent	Cumulative Percent
PA	1-2-3-4-5	9	11.4	11.4	11.4
AS	1-2-3-4-5	10	12.7	12.7	24.1
CI_QA	1-2-3-4-5	10	12.7	12.7	36.7
CI_QG	1-2-3-4-5	6	7.6	7.6	44.3
CI_S	1-2-3-4-5	5	6.3	6.3	50.6
Valid CI_GO	1-2-3-4-5	7	8.9	8.9	59.5
CI_CO	1-2-3-4-5	9	11.4	11.4	70.9
CI_CM	1-2-3-4-5	3	3.8	3.8	74.7
CI_TS	1-2-3-4-5	10	12.7	12.7	87.3
CI_MS	1-2-3-4-5	10	12.7	12.7	100.0
Total		79	100.0	100.0	

As shown in table 3 all students from different majors use the same strategies, and there was not any differences regarding the observed strategies in protocol except for summarizing and comprehension monitoring that were used more by math, natural science, and humanities. In compatibility with Reading comprehension strategies use Survey by Cohen, Oxford and Chi (2005) "summarizing" is somehow the equivalent of "note taking" related to support strategies which gained the significance of ( $p=.020 < .05$ ) in data analysis of questionnaire. (The detailed analysis regard each of statements of the questionnaire is included in appendix C).

Also, "comprehension monitoring" is the equivalent of "determining what to focus or not" as global strategies which gained the significance of ( $p=.007 < .05$ ) in data analysis of the questionnaires items. So that the detailed analysis of parameters of the questionnaire was beyond the scope of this part of the study, researcher put it in appendix C to give more information to reader. Results from Classroom observation coding protocol comparatively to other results from teacher's interviews and questionnaire was in agreement.

**C. Results of Research Hypotheses (Inferential Statistics)**

The purpose of this phase of the analysis was to make inferences from samples to populations, hypothesis testing, determine relationships among variables. The results are shown in Tables 4-12 which lists the Chi-square, P Value, and Correlations.

To find out, Is there any relationship between reading comprehension strategies used by Iranian EFL learners and their majors in high school? One-Sample Kolmogorov-Smirnov Test was run. Results of One-Sample Kolmogorov-Smirnov tests are presented in Table 4.

Table 4 One-Sample Kolmogorov-Smirnov test

		Strategies
N		789
Normal	Mean	62.2129
Parameters	Std. Deviation	26.93200
a,b	Absolute	.111
Most	Positive	.103
Extreme	Negative	-.111
Differences		
Kolmogorov-Smirnov Z		3.111
Asymp. Sig. (2-tailed)		.000

a. Test distribution is normal

b. Calculated from data

As it can be seen in table 4 the mean for reading comprehension strategies is 62.21,

Standard deviation is 26.93, Kolmogorov-Smirnov Z is 3.11. According to table 4 the Significance of (2-tailed) is ( $P=0.00<0.05$ ); then, the distribution is not normal

To compare the reading comprehension strategies used and students' majors, so that scores come from different groups, we used The Kruskal-Wallis test. The results of Kruskal's test are presented in table 5.

Table5 Kruskal's test on Iranian EFL learners Reading comprehension strategies and their majors

		N	Mean Rank	Chi-Square	df	Asymp. Sig.
Strategies	Technical	133	416.81	4.192	4	.381
	Vocational	172	410.08			
	Math	132	380.32			
	Humanities	206	394.99			
	Natural Science	146	370.66			

The statistical results of *Kruskal's test* in table 5 showed ( $\chi^2=4.192$ ,  $df= 4$ ,  $p=0.381>0.05$ ) in using global strategies by five majors (For detailed results of each statement see appendix D).

To compare the mean score of reading comprehension strategies used and students' majors, Mann-Whitney U test from non- parametric tests was conducted. This test is the alternative to the independent-samples t-tests in parametric tests. The results of Mann-Whitney U's tests with meaningful significance are presented in table 6.

Table 6 Mann-Whitney U Test Results Comparing Means of Iranian EFL learners Reading Comprehension Strategies in Technical and Math Students

		N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies	Technical	133	138.53	8043.000	.238
	Math	132	127.43		
Support Strategies	Technical	132	137.54	8046.500	.282
	Math	132	127.46		
Problem Solving Strategies	Technical	133	142.47	7518.500	.043
	Math	132	123.46		

Strategies	Technical	133	139.18	7956.500	<b>.187</b>
	Math	132	126.78		

The Mann-Whitney U test results in table4.2.4 (U=8043.000, p=. 238>.05), (U=8046.500, p=. 282>.05), (U=7518.500, p=.043<.05), (U=7956.500, p=. 187>.05) for using global, support, problem solving and overall strategies in Math and Technical students respectively. It showed that the p-value was only lower than the significance level of .05 (p< .05) in problem solving strategies in Math and Technical ((p=0 .043, p< .05).

For comparing the means of Iranian EFL learners Reading comprehension strategies Vocational and Natural science students, again Mann-Whitney U test from non- parametric tests was conducted because its distribution was

non-normal too.

Table 7 Mann-Whitney U Test Results Comparing Means of Iranian EFL learners Reading Comprehension Strategies in Vocational and Natural Science Students

		N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies	Vocational	172	167.63	11158.000	<b>.086</b>
	Natural Science	146	149.92		
Support Strategies	Vocational	172	170.99	10580.500	<b>.015</b>
	Natural Science	146	145.97		
Problem Solving Strategies	Vocational	172	159.21	12506.000	<b>.951</b>
	Natural Science	146	159.84		
Strategies	Vocational	172	166.82	11297.000	<b>.123</b>
	Natural Science	146	150.88		

The results of Whitney-Mann U test in table7 (U=11158.000, p=. 086>.05), (U=10580.500, p=. 015<.05), (U=12506.000, p=.951>.05), (U=11297.000, p=. 123>.05) in using global, support, problem solving and overall strategies by Vocational and Natural science students respectively. It showed that the p-value was only lower than the significance level of .05 (p< .05) for support strategies in Vocational and Natural science ((p= .015, p< .05). Except in two case noted before, the p-value was higher than the significance level of .05. Therefore, it can be concluded that there was no significant difference among Global, Support, and Problem Solving strategies in other majors (p> .05). (For more information see appendix E).

**V. Discussion & CONCLUSION**

The interpretations of the significant results reported in data analysis and a discussion of the practical applications of these findings to EFL instructors, reference to the literature and researcher's claims are presented. Next, the limitations of the study and giving suggestions for future research are presented.

The research question will be restated and the answers, based on the findings of the study, will be provided below.

**Question.** Is there any relationship between reading comprehension strategies used by Iranian EFL learners and their majors in high school?

#### A. Discussion

To answer the research question 1, is there any relationship between reading comprehension strategies used by Iranian EFL learners and their majors in high school, One-Sample Kolmogorov-Smirnov Test was conducted. As the results of the analysis (Table 4) indicate, Iranian high school EFL learners in different majors use the same reading comprehension strategies. Furthermore, the results obtained from the analysis of the Classroom observation coding protocol for different majors have confirmed and were in agreement to other data. Moreover, Kruskal -Wallis H, and Mann-Whitney U tests were conducted. The results of the analysis (Table5), in Kruskal's test, did not show any significant relationship in the use of overall reading comprehension strategies among the five majors.

One most interesting finding was that the results of the Mann-Whitney U test on the relationship between Iranian EFL learners Reading comprehension strategies ( sub -strategies) and students' majors (Tables 6 &7) showed a meaningful relationship in using Problem solving strategies by Technical and math students. The other meaningful relationship was using Support strategies by Vocational and Natural science students. So, the findings of this study show that the there was not any relationship between overall reading comprehension strategies used by Iranian EFL learners and their majors in high school, except for some sub-strategies and majors. Consequently research question 1 was answered.

Although very little was found in the literature on the question one specially, studies on students' majors, but the researcher found valuable findings. There are similarities between the findings in this study and those described by Tabatabaei & Assari(2011). Taking into account Iranian high school EFL teaching and learning context in which resources including time, materials, and qualified EFL teachers are nearly equal, Iranian high school EFL learners are more likely to have the same chances for the instructions to develop their reading strategies through their English classes. Bear in mind that point, this result may be defended.

Contrary to the use of overall reading comprehension strategies used by technical, Vocational, Math, Humanities, and Natural science students, Technical and math students showed preferences in using problem solving strategies that was in consistent with the study of Tabatabaei & Assari (2011), and Vocational and Natural Science students' preferences in using Support strategies. The finding may be justifiable based on the courses that students in Math and Technical majors study. However, the findings of the current study do not support the previous research, Wu (2005) reported that Taiwanese college students majoring in applied foreign language and education used more metacognitive reading strategies than those majoring in food beverage management and applied math. As Sheorey and Mokhtari (2001), Mokhtari and Reichard (2004), Martinez (2008), Malcolm (2009) and Karbalaei (2010) believed in the area of metacognitive awareness of reading strategies , the results of the researcher's study was incompatible to the previous studies regarding the use of overall reading comprehension strategies.

**H0.** There is not any relationship between reading comprehension strategies used by Iranian EFL learners and their majors in high school.

The results obtained in the previous chapter showed that Iranian High school EFL learners in different majors use similar reading comprehension strategies.

Based on the analysis of the result, null hypothesis that stating there is not any relationship between reading comprehension strategies used by Iranian EFL learners and their majors in high school was confirmed. It showed that although there were differences in the means of sub strategies (problem solving and support) use across the five majors, the differences in overall reading strategy use were not statistically significant. This finding refute somehow the previous studies indicating in using overall reading comprehension strategies for all students the same (Tabatabaei & Assari,2011; Sheorey & Mokhtari ,2001; Mokhtari & Reichard ,2004; Martineze, 2008; Malcolm ,2009, and Karbalaei ,2010)The reason might be due to the fact that students had almost the same reading task requirements across the five fields of study, as Flavell (1979) has suggested the knowledge about the demands of a task interacts with the learners' level of strategy knowledge and vice versa.

### **B. Conclusion**

The purpose of this study was to examine the relationship between Iranian high School EFL learners' reading comprehension strategies and their majors. Specifically, this study sought to investigate the relationships between applied reading comprehension strategies and students majors for junior (second grade of high school) students. Reading comprehension strategies data were collected via Reading comprehension strategy Use Survey adapted from Cohen, Oxford and Chi (2005), Classroom Observation Coding Protocol adapted in (Coyne, 1981; urkin, 1978-1979), and Teachers' interview for the use of reading comprehension strategies by their students. In general, the results of the current study supported the researcher's expectations that reading comprehension studies would not be related to student's majors.

The Kruskal-Wallis test result between variables of the overall reading comprehension strategies and different majors of students; namely, Humanities, Natural science, Math, Vocational, and Technical did not show any meaningful difference. Also, Mann-Whitney Test result between variables of the overall reading comprehension strategies and different majors of students did not show any meaningful difference. But based on Mann-Whitney Test results between variables of the reading comprehension strategies ( support, global, and problem-solving) and different majors of students ,problem -solving strategies were significantly related to math and technical students and support strategies significantly related to vocational and natural science students.

The researcher's study showed a slightly differences in using some sub- strategies for some students in specific majors; namely, problem -solving strategies for Technical and math, and Support strategies for Vocational and Natural Science students. Those differences could be due to the intellectual and background difference of students.

Because reading comprehension strategies are a significant construct in learners' education, it is important to nurture this factor in students. It is equally important for a school's learning environment to foster this as well.

## VI. Pedagogical implications

Despite the lack of support for the hypothesis found during the study, the goal of the study was accomplished. The results of this study provide researchers and instructors with a better understanding of the variables of reading comprehension strategies and students majors.

Research in the field of reading comprehension has revealed that using reading comprehension strategies for all majors in high school is the same. This information can be used by ESL and EFL writing instructors to make more informed choices in their classroom practices and pedagogy. Educators should avoid using only certain reading comprehension strategies for students in certain majors, and refrain from the use of controlling reading comprehension strategies. By noticing that Vocational high School students in Iran are students in trouble in English classes in comparison to the students of other majors, and the suggestion of managements of schools is that we should not expect more from our students by this justification that our students in referred major are not taught and learn some strategies, instruction and monitoring of reading comprehension strategies for all students in different majors in an equal manner is necessary for our teachers. These results highlight the students' individual differences and the necessity of ESL and EFL instructors' understandings of the individual differences of their students

In summation, more research needs to be done to determine the relationships of EFL learner's reading comprehension strategies and their majors.

## VII. Suggestions for Future Research

The results of this study provide potential insights for future research. First and foremost, more studies need to be done on student's majors in high school.

Because the existence of a national concern for our country's educational system regard to teaching English, research on the impact of reading comprehension strategies on students' education, further experimental research on reading comprehension strategies instruction for different majors and its effect on language achievement, the amount of its influence, and their congruent in different high school majors needs to be done. Any follow up research should take into consideration the limitations of this study and make appropriate improvements to the measures and sampling procedure employed by this study.

## Acknowledgements

We wish to express our gratitude to the professors and teachers who kindly let us in their classes to administer the questionnaire and all students who participated in this study and patiently accomplished the task.

## APPENDIX A

### Classroom Observation Coding Protocol

(Coyne, 1981; Durkin, 1978-1979)

Name:                      School:                      Male/ Female

CODE: The category in which the observed behavior occurs.

PA: Participatory Approach

This code is reserved for instances in which students present information to the class or act as conveyors of information. As defined by Jetton and Alexander (2004), the participatory approach provides students with learning opportunities that promote peer collaboration and increase the likelihood that students will construct knowledge for themselves.

AS: Assignment

The teacher checks, gives, or assists students with an assignment. The assignment may be in-class or outside of school, and includes both assignments focusing on reading and assignments focusing on content material. Assignments may also include the teacher leading students in a writing assignment. This code also includes the teacher giving tests, reviewing homework or class work assignment, and conferencing with students on individual work. In these assignments, students work independently without teacher-centered instruction.

CI-QA: Comprehension Instruction – Question Answering

The teacher asks students to answer questions from the text as a comprehension strategy.

Students independently search for answers in the text. Here the teacher provides feedback of the correctness of student responses.

CI-QA: Comprehension Instruction – Question Generation

The teacher asks students to generate questions from the text as a comprehension strategy.

Questions can be of who, what, why, when, where, and how nature. In addition to posing questions, students are responsible for answering them.

CI-S: Comprehension Instruction – Summarization

The teacher asks students to summarize informational text either orally or in writing. Here the teacher asks students to identify the main ideas and central points in a text.

CI-GO: Comprehension Instruction – Graphic Organizers

The teacher employs graphic organizers as a means for students to process and comprehend text. Graphic organizers can include any type of visual or semantic organizers intended to assist students with comprehension and to understand the meanings and relationships in text. This can include guided practice or independent practice.

CI-CO: Comprehension Instruction – Cooperative Learning

The teacher gives students independent practice in cooperative learning, where readers apply comprehension strategies together. This may include small groups or partners reading and comprehending texts together.

CI-CM: Comprehension Instruction – Comprehension Monitoring

Here the teacher asks and encourages students to be metacognitive and aware of their understanding during reading. The teacher provides students with fix-it strategies to deal with such problems. Comprehension monitoring can include teacher-led think-aloud. Additional comprehension monitor includes teacher-generated discussions of comprehension difficulties and application of strategies.

CI-TS: Comprehension Instruction – Text Structure

The teacher provides students with information on how to use narrative and informational text structure to understand text. This can include plot, sequencing, characters, and events in narrative text and text features such as titles, headings, pictures, captions, typography, charts, graphs, glossaries, and appendices in informational text.

CI-MS: Comprehension Instruction – Multiple Strategies

Here the teacher guides students in applying several procedures with flexibility and appropriate application to increase comprehension. For this code, comprehension instruction must include at least two or more combinations of the following four strategies: question generation, summarization, clarification, and prediction (NRP, 2000).

**APPENDIX B**

**Language Strategy Use Survey**

Andres D.Cohen, Rebecca L. Oxford and Julie C. Chi (2005)

Name: \_\_\_\_\_ School: \_\_\_\_\_ Sex: Male/ Female

I. The following statements are about the various techniques you use when reading materials in English. After reading each statement, circle the number (1, 2, 3, 4) which applies to you. Note that there is no right or wrong responses to any of the items on this survey.

- 1. I use this strategy and like it
- 2. I have tried this strategy and would use it again
- 3. I've never used this strategy but am interested in it
- 4. This strategy doesn't fit for me

Statement

- |  |   |   |   |   |
|--|---|---|---|---|
| 1. I have a purpose in mind when I read.   | 1 | 2 | 3 | 4 |
| 2. I take notes while reading to help me understand what I read.                 | 1 | 2 | 3 | 4 |
| 3. I think about what I know to help me understand what I read.                  | 1 | 2 | 3 | 4 |
| 4. I take an overall view of the text to see what it is about before reading it. | 1 | 2 | 3 | 4 |
| 5. When text becomes difficult, I read aloud to help me understand what I read.  | 1 | 2 | 3 | 4 |
| 6. I think about whether the content of the text fits my reading purpose.        |   |   |   |   |

1 2 3 4

7. I read slowly and carefully to make sure I understand what I am reading.

1 2 3 4

8. I review the text first by noting its characteristics like length and organization.

1 2 3 4

9. I try to get back on track when I lose concentration.

1 2 3 4

10. I underline or circle information in the text to help me remember it.

1 2 3 4

11. I adjust my reading speed according to what I am reading.

1 2 3 4

12. When reading, I decide what to read closely and what to ignore.

1 2 3 4

13. I use reference materials (e.g. dictionary) to help me understand what I read.

1 2 3 4

14. When text becomes difficult, I pay closer attention to what I am reading.

1 2 3 4

15. I use tables, figures, and pictures in text to increase my understanding.

1 2 3 4

16. I stop from time to time and think about what I am reading.

1 2 3 4

17. I use context clues to help me better understand what I am reading.

1 2 3 4

18. I paraphrase (restate ideas in my own words) to better understand what I read.

1 2 3 4

19. I try to picture or visualize information to help remember what I read.

1 2 3 4

20. I use typographical features like bold face and italics to identify key information.

1 2 3 4

21. I critically analyze and evaluate the information presented in the text.

- 1 2 3 4
22. I go back and forth in the text to find relationships among ideas in it.
- 1 2 3 4
23. I check my understanding when I come across new information.
- 1 2 3 4
24. I try to guess what the content of the text is about when I read.
- 1 2 3 4
25. When text becomes difficult, I re-read it to increase my understanding.
- 1 2 3 4
26. I ask myself questions I like to have answered in the text.
- 1 2 3 4
27. I check to see if my guesses about the text are right or wrong.
- 1 2 3 4
28. When I read, I guess the meaning of unknown words or phrases.
- 1 2 3 4
29. When reading, I translate from English into my native language.
- 1 2 3 4
30. When reading, I think about information in both English and my mother tongue.
- 1 2 3 4

What other reading strategies do I use?

End of Questionnaire

Thank You

Note:

Global strategies: Items 1, 3, 4, 6, 8, 12, 15, 17, 20, 21, 23, 24, 27

Problem solving strategies: Items 7, 9, 11, 14, 16, 19, 25, 28

Support strategies: Items 2, 5, 10, 13, 18, 22, 26, 29, 30

## APPENDIX C

### Descriptive Data of Reading Comprehension Strategies

*Table 8 Descriptive Data of Reading Comprehension Strategies in Humanities Major Students*

Item	used		have tried		have used		Doesn't fit		Mean	Std. Deviation
	f	Valid Percent	f	Valid Percent	F	Valid Percent	f	Valid Percent		
Setting purpose	98	47.8	46	22.4	36	17.6	25	12.2	1.9415	1.06940
Using prior knowledge	89	43.6	55	27.0	46	22.5	14	6.9	1.9265	.96719
Previewing the text	74	35.9	60	29.1	42	20.4	28	13.6	2.1176	1.05321
Checking fitness of content and purpose	62	30.2	52	25.4	65	31.7	26	12.7	2.2683	1.02957
Skimming the text to note its characteristics	61	29.6	59	28.6	63	30.6	21	10.2	2.2157	.98888
Determining what to focus or ignore	70	34.3	55	27.0	41	20.1	38	18.6	2.2304	1.11455
Using tables, figures and pictures	76	37.1	60	29.3	43	21.0	26	12.7	2.0927	1.04140
Using context clues	66	32.2	62	30.2	55	26.8	22	10.7	2.1610	.99923
Using typographical aids	81	39.7	55	27.0	38	18.6	30	14.7	2.0833	1.08183
Evaluating text critically	66	32.0	80	38.8	37	18.0	23	11.2	2.0825	.97179
Resolving conflicting information	71	35.0	67	33.0	35	17.2	30	14.8	2.1182	1.05108
Using context clues	80	39.0	62	30.2	37	18.0	26	12.7	2.0439	1.03990
checking the accuracy of predictions	73	35.6	69	33.7	38	18.5	25	12.2	2.0732	1.01436
note-taking	60	29.3	75	36.6	47	22.9	23	11.2	2.1610	.97440
reading aloud	62	30.2	62	30.2	44	21.5	37	18.0	2.2732	1.08172
underlining and circling	84	41.0	60	29.3	31	15.1	30	14.6	2.0341	1.07275
Using reference materials	65	31.7	61	29.8	53	25.9	26	12.7	2.1951	1.02468

global strategies  
support strategies

problem solving strategies	Paraphrasing	93	45.1	59	28.6	36	17.5	18	8.7	1.8981	.98491
	Going back and forth in the text	73	37.1	48	24.4	53	26.9	23	11.7	2.1320	1.04630
	asking oneself questions	74	36.1	60	29.3	37	18.0	34	16.6	2.1512	1.08986
	translating to native language	88	43.1	57	27.9	36	17.6	23	11.3	1.9706	1.03110
	Thinking about information in both L2 and L1	81	42.4	35	18.3	50	26.2	25	13.1	2.0995	1.09811
	reading slowly	94	45.6	63	30.6	39	18.9	10	4.9	1.8301	.90272
	Trying to stay focused on reading	68	33.3	68	33.3	42	20.6	26	12.7	2.1275	1.01876
	Adjusting reading rate	94	45.9	55	26.8	43	21.0	13	6.3	1.8780	.95474
	Paying close attention to the text	98	47.8	52	25.4	38	18.5	17	8.3	1.8732	.99188
	Pausing and thinking what is read	52	25.6	68	33.5	48	23.6	35	17.2	2.3251	1.04014
	Visualizing	80	39.2	56	27.5	44	21.6	24	11.8	2.0588	1.03936
	re-reading	72	35.6	69	34.2	30	14.9	31	15.3	2.0990	1.05571
guessing the meaning of unknown words	69	34.3	60	29.9	54	26.9	18	9.0	2.1045	.98185	

Note: f refers to the frequency

As Table8 shows, for Humanities students, the means of individual strategy use ranged from high (mean of 2.166 or higher), moderate (mean of 2.00 to 2.156) and low usage (mean of 1.99 or lower). The means of individual strategy use ranged from a high 2.32 (Pausing and thinking what is read) to a low of 1.83 (reading slowly) and the mean of overall strategy usage was 2.07 that showed a moderate overall strategy usage among Humanities participants.

A closer examination of Table8 demonstrates that for Humanities students,6 out of 30 reported strategies (20%) fell in the high usage category (mean of 2.166 or higher) and 17 strategies (56.66%) indicated moderate usage of these strategies (means between 2.00 to 2.156) and 7 strategies(23.33%) had means below 1.99 and fell in low usage strategy group. Also, it has been illustrated that:

The five highest mean of reported individual reading strategies include Global strategies, support types, and problem – solving as follows:

- 1- Global strategies: Checking fitness of content and purpose. (M= 2.26)
- 2- Global strategies: Skimming the text to note its characteristics.(M=2.21)
- 3- Global strategies: Determining what to focus or ignore. (M= 2.23)
- 4- Support: reading aloud (M= 4.20).
- 5 -Problem- solving: Pausing and thinking what is read.( M= 2.32)

And the five lowest reported reading strategies included all of the three categories of problem solving, support and global:

- 1- Global- Using prior knowledge (M= 1.92).
- 2- Support- paraphrasing (M= 1.89).
- 3- Problem- solving - reading slowly (M= 1.83).
- 4- Problem- solving - Adjusting reading rate (M= 1.87).
- 5- Problem- solving- Paying close attention to the text (M= 1.87).

Table 9 Descriptive Data of Reading Comprehension Strategies in Technical Major Students

	item	Used		have tried		have used		Doesn't fit		Mean	Std. Deviation
		f	Valid Percent	f	Valid Percent	F	Valid Percent	F	Valid Percent		
global strategies	1	58	44.3	24	18.3	24	18.3	25	19.1	2.1221	1.17685
	3	45	34.6	38	29.2	33	25.4	14	10.8	2.1231	1.01168
	4	49	38.3	31	24.2	25	19.5	23	18.0	2.1719	1.13018
	6	38	32.2	37	31.4	23	19.5	20	16.9	2.2119	1.07697
	8	35	26.9	38	29.2	30	23.1	27	20.8	2.3769	1.09449
	12	43	32.3	42	31.6	23	17.3	25	18.8	2.2256	1.09832
	15	29	22.5	46	35.7	32	24.8	22	17.1	2.3643	1.01503
	17	47	36.4	29	22.5	30	23.3	23	17.8	2.2248	1.12667
	20	45	34.9	33	25.6	24	18.6	27	20.9	2.2558	1.14755
	21	41	31.5	35	26.9	30	23.1	24	18.5	2.2846	1.10134
	23	30	22.9	36	27.5	32	24.4	33	25.2	2.5191	1.10489
	24	54	42.2	33	25.8	24	18.8	17	13.3	2.0313	1.07174
27	40	31.3	38	29.7	25	19.5	25	19.5	2.2734	1.10628	

support strategies	2	34	25.8	44	33.3	24	18.2	30	22.7	2.3788	1.10191
	5	46	36.5	25	19.8	33	26.2	22	17.5	2.2460	1.12915
	10	33	26.4	38	30.4	32	25.6	22	17.6	2.3440	1.05574
	13	52	40.9	36	28.3	21	16.5	18	14.2	2.0394	1.07202
	18	33	25.4	45	34.6	29	22.3	23	17.7	2.3231	1.04337
	22	35	27.8	31	24.6	39	31.0	21	16.7	2.3651	1.06285
	26	42	31.8	37	28.0	31	23.5	22	16.7	2.2500	1.07983
	29	33	27.7	36	30.3	35	29.4	15	12.6	2.2689	1.00589
	30	38	31.4	32	26.4	31	25.6	20	16.5	2.2727	1.08012
	problem solving strategies	7	49	38.0	38	29.5	25	19.4	17	13.2	2.0775
9		42	32.3	33	25.4	34	26.2	21	16.2	2.2615	1.08230
11		58	43.9	31	23.5	21	15.9	22	16.7	2.0530	1.12782
14		40	30.1	44	33.1	31	23.3	18	13.5	2.2030	1.02069
16		34	26.4	41	31.8	31	24.0	23	17.8	2.3333	1.05574
19		42	32.3	30	23.1	31	23.8	27	20.8	2.3308	1.13703
25		38	29.7	41	32.0	27	21.1	22	17.2	2.2578	1.06665
28		29	24.2	46	38.3	28	23.3	17	14.2	2.2750	.98700

Results show for Technical students, the means of individual strategy use ranged from high (mean of 2.35 or higher), moderate (mean of 2.19 to 2.34) and low usage (mean of 2.18 or lower). The means of individual strategy use ranged from a high of 2.51 (Resolving conflicting information) to a low of 2.03 (Using context clues) and the mean of overall strategy usage was 2.27 that showed a moderate overall strategy usage among Technical participants.

A closer examination of Table 9, demonstrates that for Technical students, 5 out of 30 reported strategies (16.66%) fell in the high usage category (mean of 2.35 or higher) and 18 strategies (60%) indicated moderate usage of these strategies (mean of 2.19 to 2.34) and 7 strategies (23.33%) had means below 2.18 and fell in low usage strategy group. Also, it has been illustrated that:

The five highest mean of reported individual reading strategies just include Global and support strategies:

- 1- Global strategies: Resolving conflicting information. (M= 2.51)
- 2- Global strategies: Skimming the text to note its characteristics. (M=2.37)
- 3- Global strategies: Using tables, figures and pictures. (M= 2.36)

4- Support: Note taking (M= 2.37).

5 - Support: Going back and forth in the text.( M= 2.36)

And the five lowest reported reading strategies included all of the three categories of problem solving, support and global:

1- Global- Using context clues (M= 2.03).

2- Global - setting purpose (M= 2.12).

3- Support - using reference materials (M= 2.03).

4- Problem- solving - reading slowly (M= 2.07).

5- Problem- solving- Pausing and thinking what is read (M= 2.05).

Table 10 Descriptive Data of Reading Comprehension Strategies in Vocational Major Students

	Item	Used		have tried		have used		Doesn't fit			
		f	Valid Percent	F	Valid Percent	F	Valid Percent	f	Valid Percent	Mean	Std. Deviation
global strategies	1	96	56.1	30	17.5	31	18.1	14	8.2	1.7836	1.01458
	3	67	39.4	49	28.8	45	26.5	9	5.3	1.9765	.93551
	4	72	42.1	47	27.5	27	15.8	25	14.6	2.0292	1.08154
	6	43	25.0	44	25.6	47	27.3	38	22.1	2.4651	1.09435
	8	55	32.4	48	28.2	33	19.4	34	20.0	2.2706	1.11884
	12	50	29.6	55	32.5	36	21.3	28	16.6	2.2485	1.05662
	15	59	35.1	41	24.4	45	26.8	23	13.7	2.1905	1.06637
	17	52	30.6	40	23.5	42	24.7	36	21.2	2.3647	1.12893
	20	74	43.3	38	22.2	30	17.5	29	17.0	2.0819	1.13463
	21	30	17.5	69	40.4	37	21.6	35	20.5	2.4503	1.00682
	23	60	35.1	57	33.3	34	19.9	20	11.7	2.0819	1.00836
	24	70	41.2	42	24.7	38	22.4	20	11.8	2.0471	1.05366
27	55	32.4	43	25.3	43	25.3	29	17.1	2.2706	1.09207	

support strategies	2	47	27.5	57	33.3	45	26.3	22	12.9	2.2456	.99907
	5	50	29.2	50	29.2	33	19.3	38	22.2	2.3450	1.12366
	10	68	39.5	46	26.7	36	20.9	22	12.8	2.0698	1.05731
	13	46	27.1	41	24.1	38	22.4	45	26.5	2.4824	1.15243
	18	67	39.2	45	26.3	44	25.7	15	8.8	2.0409	1.00210
	22	35	20.5	46	26.9	54	31.6	36	21.1	2.5322	1.04198
	26	55	32.2	51	29.8	38	22.2	27	15.8	2.2164	1.06549
	29	53	31.0	53	31.0	43	25.1	22	12.9	2.1988	1.02107
	30	55	32.7	37	22.0	31	18.5	45	26.8	2.3929	1.19898
	7	95	55.2	44	25.6	21	12.2	12	7.0	1.7093	.93491
problem solving strategies	9	77	45.8	49	29.2	24	14.3	18	10.7	1.8988	1.01273
	11	59	34.3	59	34.3	27	15.7	27	15.7	2.1279	1.05738
	14	71	41.5	52	30.4	36	21.1	12	7.0	1.9357	.95268
	16	46	26.9	64	37.4	42	24.6	19	11.1	2.1988	.96174
	19	55	32.2	65	38.0	33	19.3	18	10.5	2.0819	.96666
	25	87	50.9	45	26.3	21	12.3	18	10.5	1.8246	1.01384
	28	57	33.5	48	28.2	38	22.4	27	15.9	2.2059	1.07636

According to table10 the means of individual strategy use ranged from high (mean of 2.26 or higher), moderate (mean of 1.98 to 2.25) and low usage (mean of 1.97 or lower) for Vocational students. The means of individual strategy use ranged from a high of 2.53 (going back and forth in the text) to a low of 1.70 (reading slowly) and the mean of overall strategy usage was 2.11 that showed a moderate overall strategy usage among Technical participants. A look at the table4.6, demonstrates that for Vocational students, 9 out of 30 reported strategies (30%) fell in the high usage category (mean of 2.26 or higher) and 15 strategies (50%) indicated moderate usage of these strategies (mean of 1.98 to 2.25) and 6 strategies (20%) had means below 1.97 and fell in low usage strategy group. Also, it has been illustrated that the five highest mean of reported individual reading strategies just include Global and support strategies:

- 1- Support: Going back and forth in the text (M= 2.53).
- 2- Support - using reference materials (M= 2.48).
- 3- Global strategies: Evaluating text critically (M= 2.45).
- 4- Global strategies: Checking fitness of content and purpose (M=2.46).
- 5 - Support: Thinking about information in both L2 and L1 (M=2.39).

And the five lowest reported reading strategies included all of the three categories of problem solving, support and global:

- 1-Problem- solving - reading slowly (M= 1.70).
- 2- Global - setting purpose (M= 1.78).
- 3- Problem- solving: Trying to stay focused on reading (M=1.89)
- 4- Problem- solving: Paying close attention to the text (M=1.93).
- 5- Problem- solving: Re-reading (M= 1.82).

Table 11 Descriptive Data of Reading Comprehension Strategies in Math Major Students

	Item	Used		have tried		have used		Doesn't fit		Mean	Std. Deviation
		f	Valid Percent	f	Valid Percent	f	Valid Percent	f	Valid Percent		
global strategies	1	70	53.4	30	22.9	15	11.5	16	12.2	1.8244	1.05598
	3	71	53.8	36	27.3	16	12.1	9	6.8	1.7197	.92723
	4	61	46.2	32	24.2	19	14.4	20	15.2	1.9848	1.10505
	6	37	28.0	24	18.2	47	35.6	24	18.2	2.4394	1.08605
	8	54	41.9	23	17.8	37	28.7	15	11.6	2.1008	1.08141
	12	60	45.8	37	28.2	23	17.6	11	8.4	1.8855	.98169
	15	36	27.5	42	32.1	32	24.4	21	16.0	2.2901	1.04136
	17	43	32.8	32	24.4	25	19.1	31	23.7	2.3359	1.16758
	20	67	51.1	29	22.1	16	12.2	19	14.5	1.9008	1.10143
	21	47	36.2	41	31.5	26	20.0	16	12.3	2.0846	1.02703
support strategies	23	56	42.7	38	29.0	24	18.3	13	9.9	1.9542	1.00661
	24	51	38.6	44	33.3	26	19.7	11	8.3	1.9773	.96080
	27	47	35.6	40	30.3	28	21.2	17	12.9	2.1136	1.03855
	2	30	22.7	61	46.2	24	18.2	17	12.9	2.2121	.94125
	5	45	34.1	31	23.5	35	26.5	21	15.9	2.2424	1.09210
	10	58	44.3	47	35.9	15	11.5	11	8.4	1.8397	.93494
	13	50	37.9	39	29.5	19	14.4	24	18.2	2.1288	1.11482
	18	67	50.8	35	26.5	13	9.8	17	12.9	1.8485	1.05197

problem solving strategies	22	40	30.3	49	37.1	28	21.2	15	11.4	2.1364	.97896
	26	43	32.6	37	28.0	28	21.2	24	18.2	2.2500	1.10083
	29	62	47.7	38	29.2	21	16.2	9	6.9	1.8231	.94389
	30	49	37.4	23	17.6	36	27.5	23	17.6	2.2519	1.13912
	7	71	53.8	29	22.0	23	17.4	9	6.8	1.7727	.96970
	9	51	38.6	54	40.9	17	12.9	10	7.6	1.8939	.90172
	11	62	47.0	33	25.0	26	19.7	11	8.3	1.8939	.99815
	14	63	48.5	29	22.3	18	13.8	20	15.4	1.9615	1.11650
	16	34	26.0	39	29.8	29	22.1	29	22.1	2.4046	1.10090
	19	70	53.0	39	29.5	15	11.4	8	6.1	1.7045	.89731
	25	62	47.3	35	26.7	24	18.3	10	7.6	1.8626	.97478
	28	58	43.9	43	32.6	23	17.4	8	6.1	1.8561	.91745

Calculated data as shown in table11 revealed that for Math students the means of individual strategy use ranged from high (mean of 2.19 or higher), moderate (mean of 1.95 to 2.18) and low usage (mean of 1.94 or lower). The means of individual strategy use ranged from a high of 2.43 (checking fitness of content and purpose) to a low of 1.70 (visualizing) and the mean of overall strategy usage was 2.06 that showed a moderate overall strategy usage among Math participants.

A look at the table4.1.5, demonstrates that for Vocational students,9 out of 30 reported strategies (30%) fell in the high usage category (mean of 2.19 or higher) and 9 strategies (30%) indicated moderate usage of these strategies (mean of 1.95 to 2.18) and 12 strategies(40%) had means below 1.94and fell in low usage strategy group. Also, it has been illustrated that: The five highest mean of reported individual reading strategies include all Global, support, and problem-solving strategies:

- 1-Global strategies: Checking fitness of content and purpose (M= 2.43).
- 2-Problem-solving strategies - pausing and thinking what is read (M= 2.40).
- 3- Global strategies: using context clues (M= 2.33).
- 4- Global strategies: using tables and figures (M=2.29).
- 5 - Support: Thinking about information in both L2 and L1 (M=2.25).

And the five lowest reported reading strategies included all of the three categories of problem solving, support and global:

- 1- Problem- solving - visualizing (M= 1.70).
- 2- Global strategies - using prior knowledge (M= 1.71).
- 3- Problem- solving: reading slowly (M=1.77)

4- Support: translating to native language (M=1.82).

5- Global strategies: setting purpose (M= 1.82).

Table 12 Descriptive Data of Reading Comprehension Strategies in Natural Science Major Students

	Item	Used		have tried		have used		Doesn't fit		Mean	Std. Deviation
		f	Valid Percent	f	Valid Percent	f	Valid Percent	f	Valid Percent		
global strategies	1	77	44.8	36	20.9	33	19.2	26	15.1	2.0465	1.11771
	3	66	38.2	53	30.6	39	22.5	15	8.7	2.0173	.97929
	4	60	34.7	49	28.3	43	24.9	21	12.1	2.1445	1.03257
	6	74	43.0	45	26.2	36	20.9	17	9.9	1.9767	1.02000
	8	69	40.1	57	33.1	28	16.3	18	10.5	1.9709	.99371
	12	73	42.4	51	29.7	32	18.6	16	9.3	1.9477	.99275
	15	66	38.6	49	28.7	36	21.1	20	11.7	2.0585	1.03303
	17	83	48.5	49	28.7	22	12.9	17	9.9	1.8421	.99628
	20	87	50.3	45	26.0	28	16.2	13	7.5	1.8092	.96661
	21	85	49.7	43	25.1	25	14.6	18	10.5	1.8596	1.02507
	23	69	40.1	46	26.7	38	22.1	19	11.0	2.0407	1.03369
	24	85	49.1	45	26.0	29	16.8	14	8.1	1.8382	.98083
	27	75	43.4	41	23.7	41	23.7	16	9.2	1.9884	1.02293
pro support strategies	2	76	44.7	39	22.9	35	20.6	20	11.8	1.9941	1.06308
	5	67	38.7	43	24.9	31	17.9	32	18.5	2.1618	1.13473
	10	55	32.0	65	37.8	40	23.3	12	7.0	2.0523	.91296
	13	79	45.9	40	23.3	32	18.6	21	12.2	1.9709	1.06747
	18	53	30.6	49	28.3	42	24.3	29	16.8	2.2717	1.07355
	22	87	50.3	47	27.2	28	16.2	11	6.4	1.7861	.93724
	26	78	45.1	42	24.3	27	15.6	26	15.0	2.0058	1.10231
	29	57	33.3	59	34.5	34	19.9	21	12.3	2.1111	1.00846
	30	100	61.3	34	20.9	20	12.3	9	5.5	1.6196	.90410
	ble	7	69	39.9	45	26.0	31	17.9	28	16.2	2.1040

9	60	34.7	49	28.3	41	23.7	23	13.3	2.1561	1.04766
11	78	45.9	46	27.1	23	13.5	23	13.5	1.9471	1.06733
14	58	34.1	60	35.3	29	17.1	23	13.5	2.1000	1.02426
16	64	37.0	54	31.2	40	23.1	15	8.7	2.0347	.97585
19	80	46.2	46	26.6	32	18.5	15	8.7	1.8960	.99454
25	60	34.9	59	34.3	29	16.9	24	14.0	2.0988	1.03540
28	86	49.7	45	26.0	30	17.3	12	6.9	1.8150	.95868

Finally, as Table12 shows, for Natural science students, the means of individual strategy use ranged from high (mean of 2.05 or higher), moderate (mean of 1.83 to 2.04) and low usage (mean of 1.82 or lower). The means of individual strategy use ranged from a high of 2.27 (paraphrasing) to a low of 1.61 (Thinking about information in both L2 and L1) and the mean of overall strategy usage was 1.94 that showed a moderate overall strategy usage among Natural science participants.

A closer examination of Table4.1.6, demonstrates that for Natural science students, 4 out of 30 reported strategies (13.33%) fell in the high usage category (mean of 2.05 or higher) and 16 strategies (53.33%) indicated moderate usage of these strategies (mean of 1.83 to 2.04) and 10 strategies (33.33%) had means below 1.82 and fell in low usage strategy group. Also, it has been illustrated that:

The five highest mean of reported individual reading strategies include all global, support, and problem solving strategies:

- 1- Support strategies: paraphrasing. (M= 2.27)
- 2- Support strategies: read aloud.(M=2.16)
- 3- Support strategies: translating in native language. (M= 2.11)
- 4- Global strategies: Reviewing the text (M= 2.14).
- 5 - problem-solving: Trying to stay focused on reading.( M= 2.15)

And the five lowest reported reading strategies included all of the three categories of problem solving, support and global:

- 1- Global- Using context clues (M= 1.83).
- 2- Global - Using typographic aids (M= 1.80).
- 3- Support - Thinking about information in both L2 and L1 (M= 1.61).
- 4- Problem- solving - Guessing the meaning of the underlined words (M= 1.81).
- 5- Support - going back and forth in the text (M= 1.78).

Appendix D

Table 13 Kruskal-Wallis Test Results on Reading Comprehension Strategies and Students' Majors

	N	Mean	Std. Deviation	Chi-Square	Sig.
1	Technical	131	2.1221	8.88	0.06
	Vocational	171	1.7836		
	Math	131	1.8244		
	Humanities	205	1.9415		
	Natural Science	145	2.0276		
	Total	783	1.9336		
3	Technical	130	2.1231	14.04	0.007
	Vocational	170	1.9765		
	Math	132	1.7197		
	Humanities	204	1.9265		
	Natural Science	146	2.0342		
	Total	782	1.9552		
4	Technical	128	2.1719	3.86	0.42
	Vocational	171	2.0292		
	Math	132	1.9848		
	Humanities	204	2.1176		
	Natural Science	146	2.1370		
	Total	781	2.0883		
6	Technical	118	2.2119	13.93	0.007
	Vocational	172	2.4651		
	Math	132	2.4394		
	Humanities	205	2.2683		
	Natural Science	145	2.0690		
	Total	772	2.2953		

8	Technical	130	2.3769	1.09449		
	Vocational	170	2.2706	1.11884		
	Math	129	2.1008	1.08141		
	Humanities	204	2.2157	.98888	10.72	0.03
	Natural Science	146	1.9932	.97907		
	Total	779	2.1938	1.05488		
12	Technical	133	2.2256	1.09832		
	Vocational	169	2.2485	1.05662		
	Math	131	1.8855	.98169	14.49	0.006
	Humanities	204	2.2304	1.11455		
	Natural Science	145	1.9793	1.01700		
	Total	782	2.1292	1.06748		
15	Technical	129	2.3643	1.01503		
	Vocational	168	2.1905	1.06637		
	Math	131	2.2901	1.04136	10.01	0.04
	Humanities	205	2.0927	1.04140		
	Natural Science	144	2.0486	1.05333		
	Total	777	2.1840	1.04824		
17	Technical	129	2.2248	1.12667		
	Vocational	170	2.3647	1.12893	20.99	0.0001
	Math	131	2.3359	1.16758		
	Humanities	205	2.1610	.99923		
	Natural Science	144	1.8403	.97996		
	Total	779	2.1861	1.08862		
20	Technical	129	2.2558	1.14755		
	Vocational	171	2.0819	1.13463		
	Math	131	1.9008	1.10143	12.57	0.01
	Humanities	204	2.0833	1.08183		

21	Natural Science	146	1.8356	.98280	26.37	0.0001
	Total	781	2.0346	1.09665		
	Technical	130	2.2846	1.10134		
	Vocational	171	2.4503	1.00682		
	Math	130	2.0846	1.02703		
23	Humanities	206	2.0825	.97179	20.54	0.0001
	Natural Science	146	1.9247	1.03114		
	Total	783	2.1673	1.03586		
	Technical	131	2.5191	1.10489		
	Vocational	171	2.0819	1.00836		
24	Math	131	1.9542	1.00661	4.62	0.32
	Humanities	203	2.1182	1.05108		
	Natural Science	146	2.1027	1.04867		
	Total	782	2.1471	1.05549		
	Technical	128	2.0313	1.07174		
27	Vocational	170	2.0471	1.05366	8.30	0.08
	Math	132	1.9773	.96080		
	Humanities	205	2.0439	1.03990		
	Natural Science	146	1.8356	.98280		
	Total	781	1.9923	1.02529		
2	Technical	128	2.2734	1.10628		
	Vocational	170	2.2706	1.09207		
	Math	132	2.1136	1.03855		
	Humanities	205	2.0732	1.01436		
	Natural Science	146	1.9795	1.02027		
	Total	781	2.1383	1.05555		
	Technical	132	2.3788	1.10191		
	Vocational	171	2.2456	.99907		

	Math	132	2.2121	.94125	10.92	0.02
	Humanities	205	2.1610	.97440		
	Natural Science	143	1.9930	1.05814		
	Total	783	2.1941	1.01680		
	Technical	126	2.2460	1.12915		
5	Vocational	171	2.3450	1.12366		
	Math	132	2.2424	1.09210	4.68	0.32
	Humanities	205	2.2732	1.08172		
	Natural Science	146	2.0959	1.13459		
	Total	780	2.2462	1.11054		
10	Technical	125	2.3440	1.05574		
	Vocational	172	2.0698	1.05731		
	Math	131	1.8397	.93494	15.98	0.003
	Humanities	205	2.0341	1.07275		
	Natural Science	145	2.0207	.89341		
13	Total	778	2.0566	1.02071		
	Technical	127	2.0394	1.07202		
	Vocational	170	2.4824	1.15243		
	Math	132	2.1288	1.11482	19.46	0.001
	Humanities	205	2.1951	1.02468		
18	Natural Science	145	1.9862	1.06057		
	Total	779	2.1823	1.09457		
	Technical	130	2.3231	1.04337		
	Vocational	171	2.0409	1.00210		
	Math	132	1.8485	1.05197	29.61	0.0001
	Humanities	206	1.8981	.98491		
	Natural Science	146	2.3082	1.05415		
	Total	785	2.0675	1.03843		

22	Technical	126	2.3651	1.06285		
	Vocational	171	2.5322	1.04198		
	Math	132	2.1364	.97896	44.13	0.0001
	Humanities	197	2.1320	1.04630		
	Natural Science	146	1.7945	.94627		
	Total	772	2.1956	1.04594		
26	Technical	132	2.2500	1.07983		
	Vocational	171	2.2164	1.06549		
	Math	132	2.2500	1.10083	4.74	0.31
	Humanities	205	2.1512	1.08986		
	Natural Science	146	2.0342	1.09805		
	Total	786	2.1768	1.08635		
29	Technical	119	2.2689	1.00589		
	Vocational	171	2.1988	1.02107	19.01	0.001
	Math	130	1.8231	.94389		
	Humanities	204	1.9706	1.03110		
	Natural Science	144	2.1458	1.04426		
	Total	768	2.0755	1.02232		
30	Technical	121	2.2727	1.08012		
	Vocational	168	2.3929	1.19898		
	Math	131	2.2519	1.13912	34.92	0.0001
	Humanities	191	2.0995	1.09811		
	Natural Science	136	1.6765	.94188		
	Total	747	2.1432	1.12352		
7	Technical	129	2.0775	1.05039		
	Vocational	172	1.7093	.93491		
	Math	132	1.7727	.96970	14.83	0.001
	Humanities	206	1.8301	.90272		

9	Natural Science	146	2.1096	1.10249		
	Total	785	1.8866	.99547		
	Technical	130	2.2615	1.08230		
	Vocational	168	1.8988	1.01273		
	Math	132	1.8939	.90172	14.83	0.005
11	Humanities	204	2.1275	1.01876		
	Natural Science	146	2.1712	1.05281		
	Total	780	2.0692	1.02364		
	Technical	132	2.0530	1.12782		
	Vocational	172	2.1279	1.05738		
14	Math	132	1.8939	.99815	7.32	0.12
	Humanities	205	1.8780	.95474		
	Natural Science	143	1.9091	1.05423		
	Total	784	1.9707	1.03596		
	Technical	133	2.2030	1.02069		
16	Vocational	171	1.9357	.95268		
	Math	130	1.9615	1.11650	10.68	0.30
	Humanities	205	1.8732	.99188		
	Natural Science	145	1.9862	.95005		
	Total	784	1.9783	1.00613		
19	Technical	129	2.3333	1.05574		
	Vocational	171	2.1988	.96174	25.38	0.0001
	Math	131	2.4046	1.10090		
	Humanities	203	2.3251	1.04014		
	Natural Science	146	2.0068	.97200		
19	Total	780	2.2526	1.03050		
	Technical	130	2.3308	1.13703	25.38	0.0001
	Vocational	171	2.0819	.96666		

25	Math	132	1.7045	.89731		
	Humanities	204	2.0588	1.03936		
	Natural Science	146	1.9247	1.01088		
	Total	783	2.0243	1.02808		
	Technical	128	2.2578	1.06665		
	Vocational	171	1.8246	1.01384		
	Math	131	1.8626	.97478	18.70	0.001
	Humanities	202	2.0990	1.05571		
	Natural Science	146	1.9795	.98589		
	Total	778	2.0026	1.03105		
	Technical	120	2.2750	.98700		
	Vocational	170	2.2059	1.07636	20.63	0.0001
	28	Math	132	1.8561	.91745	
Humanities		201	2.1045	.98185		
Natural Science		146	1.8699	.99144		
Total		769	2.0663	1.00624		

The mean difference is significant at \*p<0.05

## Appendix E

### Mann-Whitney U's Test Results

Table14 Mann-Whitney U Test Results to Compare Means of Iranian EFL Learners Reading Comprehension Strategies and Technical and Vocational Students

		N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies	Technical	133	154.13	11287.500	.844
	Vocational	172	152.13		
Support Strategies	Technical	132	149.55	10962.000	.607

		Vocational	172	154.77		
Problem Solving Strategies		Technical	133	161.85	10260.500	<b>.122</b>
		Vocational	172	146.15		
Strategies		Technical	133	154.46	11244.000	<b>.799</b>
		Vocational	172	151.87		

Table15 Mann-Whitney U Test Results to Compare Means of Iranian EFL Learners Reading Comprehension Strategies and Technical and Humanities Students

			N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies		Technical	174.67	133	13078.500	<b>.480</b>
		Humanities	166.99	206		
Support Strategies		Technical	177.11	132	12591.500	<b>.251</b>
		Humanities	164.62	206		
Problem Solving Strategies		Technical	177.83	133	12657.500	<b>.236</b>
		Humanities	164.94	206		
Strategies		Technical	175.83	133	12923.000	<b>.378</b>
		Humanities	166.23	206		

Table15 Mann-Whitney U Test Results to Compare Means of Iranian EFL Learners Reading Comprehension Strategies Technical and Natural Science Students

			N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies		Technical	148.53	133	8574.500	<b>.091</b>
		Natural Science	132.23	146		
Support Strategies		Technical	149.10	132	8368.500	<b>.064</b>
		Natural Science	130.82	146		
Problem Solving Strategies		Technical	147.17	133	8756.000	<b>.155</b>
		Natural Science	133.47	146		
Strategies		Technical	148.34	133	8599.500	<b>.099</b>

Natural Science 132.40 146

Table16Mann-Whitney U Test Results to Compare Means of Iranian EFL Learners Reading Comprehension Strategies Vocational and Math Students

		N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies	Vocational	172	157.48	10495.500	<b>.259</b>
	Math	132	146.01		
Support Strategies	Vocational	172	159.05	10225.500	<b>.137</b>
	Math	132	143.97		
Problem Solving Strategies	Vocational	172	155.05	10913.000	<b>.561</b>
	Math	132	149.17		
Strategies	Vocational	172	157.40	10510.000	<b>.267</b>
	Math	132	146.12		

Table17Mann-Whitney U Test Results to Compare Means of Iranian EFL Learners Reading Comprehension Strategies Vocational and Humanities Students

		N	Mean Rank	Mann-Whitney U	symp. Sig.
Global Strategies	Vocational	172	193.01	17112.000	<b>.567</b>
	Humanities	206	186.57		
Support Strategies	Vocational	172	200.11	15890.500	<b>.084</b>
	Humanities	206	180.64		
Problem Solving Strategies	Vocational	172	186.41	17184.000	<b>.613</b>
	Humanities	206	192.08		
Strategies	Vocational	172	193.49	17030.000	<b>.516</b>
	Humanities	206	186.17		

Table17 Mann-Whitney U Test Results to Compare Means of Iranian EFL Learners Reading Comprehension Strategies Math and Humanities Students

		N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies	Math	132	165.23	13032.500	<b>.519</b>
	Humanities	206	172.24		
Support Strategies	Math	132	169.74	13564.000	<b>.971</b>
	Humanities	206	169.34		
Problem Solving Strategies	Math	132	162.08	12616.500	<b>.261</b>
	Humanities	206	174.25		
Strategies	Math	132	165.59	13080.000	<b>.556</b>
	Humanities	206	172.00		

Table18 Mann-Whitney U Test Results to Compare Means of Iranian EFL Learners Reading Comprehension Strategies Math and Natural science Students

		N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies	Math	132	141.72	9342.500	<b>.660</b>
	Natural Science	146	137.49		
Support Strategies	Math	132	144.01	9041.000	<b>.372</b>
	Natural Science	146	135.42		
Problem Solving Strategies	Math	132	136.28	9211.000	<b>.523</b>
	Natural Science	146	142.41		
Strategies	Math	132	141.33	9394.000	<b>.717</b>
	Natural Science	146	137.84		

Table19 Mann-Whitney U Test Results to Compare Means of Iranian EFL Learners Reading Comprehension Strategies Natural science and Humanities Students

		N	Mean Rank	Mann-Whitney U	Asymp. Sig.
Global Strategies	Humanities	206	182.17	13871.000	<b>.214</b>
	Natural Science	146	168.51		

Support Strategies	Humanities	206	181.00	14110.500	.322
	Natural Science	146	170.15		
Problem Solving Strategies	Humanities	206	178.20	14687.500	.708
	Natural Science	146	174.10		
Strategies	Humanities	206	181.08	14094.500	.315

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## The effect of Mindfulness-Based Stress Reduction (MBSR) on increasing the scales of mindfulness in Iranian people with social anxiety disorder

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### Abstract

Mindfulness-based stress reduction (MBSR) is shown as an effective intervention for reducing the signs and the symptoms of stress, depression and anxiety. Social anxiety as a common problem in the realm of childhood, juvenile and adulthood can be trained under MBSR to reduce cognitive distortions from self-socialization to create greater compliance. In this study, 21 Iranian subjects with social anxiety disorder (SAD) were selected according to the Social Phobia Inventory (SPIN), and the Structured Clinical Interview based on Diagnostic and Statistical Manual of Mental Disorders (SCID-I). The mindfulness group (10 subjects), received eight sessions of MBSR-based therapy, while the control group was expected to remain. The subjects completed the five-facet mindfulness questionnaire before and after treatment. Data analysis was performed by comparing mean scores of pre-test - post-test, based on Mann-Whitney U test. The results showed that MBSR program has increased mindfulness skills in all related sub-scales. According to our findings, MBSR, despite belonging to a distinct cultural context, is effective in increasing the skills of mindfulness in Iranian patients with SAD and that may be due to the existence of the same basic neural processes among different populations.

Keywords: Mindfulness-based stress reduction, MBSR, Mindfulness skills, Social anxiety disorder, SAD, Iranian people

### Introduction

Social anxiety disorder (SAD), a psychological situation characterized by symptoms such as debilitating anxiety and too obvious vigilance in routine public situations, is appeared as fear and avoidance of communal interactions along with physiological symptoms (Jefferys, 1997; Kessler et al., 1994). People with SAD have a chronic continuous fear of being humiliated, judged and evaluated negatively by others. Intensity of the fear may rise as much as affect their critical performance (M. B. Stein & Stein, 2008). The high prevalence of this disorder (13%) (Kessler et al., 1994), along with high levels of stress and its associated problems, becomes a public health concern nowadays (Kashdan, Ferssizidis, Collins, & Muraven, 2010). In this way, fortunately, a variety of psychological approaches, including psychoanalysis, behavioral therapy, cognitive therapy and cognitive-behavioral therapy (CBT) have been developed (Barlow, 2002). Nevertheless, the contradictory results as well as the unsustainable treatments, introduced a new dimension in the area of CBTs. So, we see that in the last decade, the third wave therapies such as mindfulness- and acceptance- based methods have been proposed to improve cognitive - behavioral interventions and boost the effectiveness of treatment (Hayes, 2004). According to several

studies, mindfulness-based treatment has been an effective approach in the range of mood and anxiety disorders, and preliminary investigations have proven the claim (P. R. Goldin & Gross, 2010). The concept of mindfulness has attracted much attention in the field of emotional basic researches, clinical sciences, and Cognitive Neuroscience. Mindfulness-based stress reduction (MBSR), as a structured group program developed by Kabat-Zinn in 1990, can be pointed as one of the most important mindfulness-based treatments (Pickert, 2014). This method, as an efficient way of clinical interventions related to anxiety disorders, depression and other areas, has been attended and supported by many researchers (Bowen et al., 2006; Carmody, Baer, L. B. Lykins, & Olendzki, 2009). According to several studies on mood and anxiety disorders, MBSR has been a productive treatment, and preliminary investigations indicate that this method can also be effective in the treatment of SAD (P. Goldin, Ziv, Jazaieri, Hahn, & Gross, 2013; P. R. Goldin & Gross, 2010). In a study by Goldin and Gross on patients with SAD, it has been found that during treatment, individuals who had practiced focused attention on breathing, had fewer negative emotional experiences and decreased amygdala activity, while, showed increased performance of the brain regions associated with attention (P. R. Goldin & Gross, 2010). Their explanation was that MBSR training may reduce avoidance behaviors and clinical symptoms and automatic reactivity (P. R. Goldin & Gross, 2010). In addition, preliminary evidence suggests that the use of MBSR technique reduces biased perception and improves people's interpretation, performance and quality of life (Carlson, Speca, Patel, & Goodey, 2003). Today, numerous studies are being conducted on the effectiveness of the mentioned treatment and its impact on distinct cultures (Brady, O'Connor, Burgermeister, & Hanson, 2012; P. R. Goldin & Gross, 2010). Moreover, Carmody believes that in order to clarify the effect of mindfulness training, it must be used in different cultures (Carmody et al., 2009). So, this research has been performed in order to determine the effect of the mindfulness-based stress reduction program to increase the skills of mindfulness in typical social anxiety disorder in Iranian population. In Iran, MBSR has been used to improve the skills of mindfulness in various complications such as exam anxiety (chamarkohi & Mohammadamini, 2012), depression in patients with chronic low back pain (Masumian, Golzari, Shairi, & Momenzadeh, 2013), obsessive - compulsive disorder (Sajadian, Neshat Doost, Moolavi, & Maroofi, 2008), rumination and depression (Azargoon, Kajbaf, Moulavi, & Abedi, 2009), negative thoughts, anxiety and depression (Kaviani, Hatami, & Abdollah, 2009), and panic disorder (Sohrabi, Jafarifard, Zarei, & Eskandari, 2013). However, the efficacy of MBSR to increase mindfulness skills in social anxiety disorder has not been investigated so far. Thus, according to the above statements, SAD is accompanied with a wide range of functional disorders in emotional, professional and interpersonal life. Because in recent years, mindfulness program has been used to treat multiple disorders, but an appropriate research on its effectiveness in Iran has not been performed so far, the main issue of this study is to examine whether mindfulness-based stress reduction can increase the mindfulness of people with social anxiety in Iranian population.

## Methods

### Participants

Statistical population included 21 students of Shahed University (Tehran, Iran) who show symptoms of social anxiety disorder. The 21 patients were randomly divided into two groups, 10 in the mindfulness group and 11 in the control group. The sample size considered close to the same studies performed outside Iran (Atrifard et al., 2013; chamarkohi & Mohammadamini, 2012; Philippe Goldin, Ramel, & Gross, 2009; P. R. Goldin & Gross, 2010; Sajadian et al., 2008).

## Procedure

This study was a Quasi-experimental, pretest - posttest study with mindfulness and control groups. So, the independent variable is the mindfulness-based stress reduction program (MBSR), and Mindfulness scales are considered as dependent variables. Entry criteria were as follows: the age range 18 to be 30 years old, with symptoms of social anxiety disorder based on the Social Phobia Inventory (SPIN) (Connor et al., 2000) and the Structured Clinical Interview according to DSM-IV (SCID-I) (First, Spitzer, Miriam, & Williams, 2002) and being satisfied to participate. Exclusion criteria included pharmacological or non-pharmacological psychological treatments, participants' withdrawal prior to the completion of the treatment sessions and also existence a concurrent diagnosis of avoidant personality, obsessive-compulsive disorder and depression. Flow of participants through the study is demonstrated in figure 1.

Intervention: Selected subjects were divided into mindfulness and control groups, and pre-test was conducted in accordance with specified tools. Then, eight sessions of stress reduction group therapy based on mindfulness-based stress reduction (MBSR) were conducted for the experimental group and finally two groups were evaluated at the end of the eighth session. MBSR sessions are held weekly as eight 120-minute group sessions. In this study, a treatment plan was based on the content of the MBSR program of Kabat - Zinn (Ludwig & Kabat-Zinn, 2008) and MBSR Workbook (Stahl & Goldstein, 2010). The sessions aimed to teach the concept of mindfulness, awareness of the connection between mind and body, mindfulness during breathing, stay in the present moment, eight attitudes of mindfulness training (nonjudging, beginner's mind, acceptance, drop, patience, without effort and kindness and relying on self-feelings) using the techniques and skills of mindfulness meditation and yoga in both formal and informal approaches.

## Measures

Social Phobia Inventory (SPIN): This questionnaire was prepared by Connor and colleagues to assess social anxiety (Connor et al., 2000). This questionnaire is a self-assessment tool that consists of three sub-scales including fear (six items), avoidance (seven items), and physical discomfort (four items). SPIN is scaled based on the Likert scale of 5 degrees. Appropriate psychometric properties of this questionnaire have been reported in the American population. The test-retest coefficient during the 2-weeks has been reported between 0.78 and 0.89, and its internal consistency by Cronbach's alpha has been reported between 0.89 and 0.94 (Connor et al., 2000). In Iran, this tool was carried out on two groups with social anxiety and anxiety disorders along with healthy controls, and the results have been indicated significant mean differences between three groups (Atrifard et al., 2013). In a study by Hasanvand Amoozadeh et al., the Cronbach's alpha of the test was obtained between 0.74 and 0.89 and the test-retest coefficient was calculated 0.68 and its sub-scales validity with the validity of SCL-90-R social phobia sub-scales and the self-Esteem (SERS) grading scale was obtained between 0.64 obtained 0.78 (Hasanvand Amoozadeh, 2013). The questionnaire was used in the first stage of research and pre and post-test stages to measure social anxiety in participants.

The diagnostic interview based on DSM-IV (SCID-I): This interview is based on the symptomatic criteria of "Diagnostic and Statistical Manual of Mental Disorders, Forth Edition" (*Diagnostic and Statistical Manual of Mental Disorders (DSM)*, 2000). Social anxiety diagnosis was confirmed through this interview. In this regard, according to DSM-IV, the differential diagnosis includes: panic disorder with or without agoraphobia, agoraphobia without history of panic, generalized anxiety disorder, schizoid personality disorder, avoidant personality disorder, physical deformity disorder, major depressive disorder, depression and schizophrenia. Amini et al examined the validity of this interview and evaluated the

validation based on the kappa index above 4.0. Furthermore, this study reported a better specificity compared to sensitivity for this interview, if the diagnosis provided by psychiatrists considered the Gold Standard (Amini et al., 2004). This interview is translated into Persian, and the questions associated with social anxiety disorder and related differential diagnosis is separated from the main collection and was used to confirm the diagnosis of people with social anxiety in this study.

Five-facet mindfulness questionnaire (FFMQ): This questionnaire is developed by the combination of Freiburg Mindfulness Inventory (FMI) (Walsh, Balint, Smolira Sj, Fredericksen, & Madsen, 2009), Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003), Kentucky Inventory of Mindfulness Skills (Baer, Smith, & Allen, 2004), and Five-Facet Mindfulness Questionnaire by Bauer et al using factor analysis approach (Baer et al., 2008). In 2006, Baer conducted exploratory factor analysis on a sample of university students (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). The questionnaire had 112 items and based on the results; four from the five factors were comparable with KIMS known factors, and the fifth factor include items from FMI and MQ, which was defined as a non-reactivity state to inner experience. Five factors of mindfulness (observing, describing, acting with awareness, nonjudging of inner experience and nonreactivity to inner experience) with 39 items were inspected. Baer et al. reported an appropriate internal consistency between factors and calculated alpha coefficient for nonreactivity to inner experience equal to 0.75, 0.91 for describing, 0.83 for observing, 0.87 for acting with awareness, and 0.87 for nonjudging of inner experience (Baer et al., 2006). correlation between the factors was significant and was reported in the range of 0.15 to 0.34 (Neuser, 2010). In a study by Ahmadvand and colleagues in Iran (Ahmadvand, Heydarinasab, & Shairi, 2012), aimed to evaluate the psychometric properties of the questionnaire, the alpha coefficients were reported in a range from 0.55 to 0.83. The results also demonstrated that the correlation coefficient of the whole questionnaire is equal to 8.0, and most of the correlation between five factors related to nonjudging of inner experience (0.57). To check the validity of this tool, NEO-FFI questionnaire, Schering Emotional Intelligence Questionnaire, psychological well-being questionnaire and SCL-25 questionnaires were used (Ahmadvand et al., 2012). The results showed good reliability and convergent-divergent validity for five-facet mindfulness questionnaire in non-clinical Iranian samples (Ahmadvand, Heydarinasab, & Shairi, 2013).

#### Data analysis

In addition to using descriptive statistics, due to the lack of assumptions of parametric statistics, the means difference related to the pre-test - post-test and also pre-test between the two groups, was compared using non-parametric Mann-Whitney test.

#### Results

The aim of this study was to determine the effectiveness of the "mindfulness-based stress reduction program" on increasing the mindfulness in Iranian people with social anxiety. In this regard, after the process of intervention and evaluation, data were analyzed. Descriptive indicator related to the age of the participants of the mindfulness and the control groups and comparison of the two groups before intervention based on the Mann-Whitney test is presented in Table 1. As it can be seen, two groups were not significantly different from each other.

The social anxiety and mindfulness of the mindfulness and the control groups before intervention are also shown and compared with each other in **Error! Reference source not found.**

The results in Table 2 show that the Z score related to the comparison between two groups in the social anxiety and in any of its sub-scales (fear, avoidance and physiological symptoms) and also in the mindfulness level and in any of its sub-scales (observing, describing, acting with awareness, nonjudging of inner experience and nonreactivity to inner experience) was not significant in the pre-intervention stage.

Descriptive indicator related to the five-facet mindfulness questionnaire (FFMQ) of participants in both the Mindfulness and control groups before, and after the experimental is shown in Table 3. As it can be seen, in the experimental group, indicators are meaningfully different before and after the intervention, while the control group did not differ considerably.

Results in Table 4 shows that mindfulness-based stress reduction program could increase mindfulness in general and in terms of observing, describing, acting with Awareness, nonjudging of inner experience and nonreactivity to inner experience in the mindfulness group compared to the control group.

In order to facilitate the comparison between mindfulness and control groups with each other about the mindfulness and its sub-scales, the group results related to percent of score changes are presented in Table 5. The mean of percentage changes in each sub-scale score of the mindfulness group is more than the control group. This means that the mindfulness in the mindfulness group after the mindfulness-based stress reduction is dramatically increased compared with the control group.

## Discussion

The aim of this study was to examine the effectiveness of the mindfulness-based stress reduction (MBSR) program to increase mindfulness skills in people with social anxiety. The results of this study suggest that the use of MBSR leads to an increase in mindfulness in people with SAD or in generally in five dimensions: observing, describing, acting with Awareness, nonjudging of inner experience and nonreactivity to inner experience. In explaining the mechanism of these method (MBSR) neuropsychologically, several authors had presented their views. Based on emotion regulation process model of Gross (P. Goldin et al., 2013), emotion regulation strategies such as the position selection, making up attention, cognitive alteration and adjustment of reaction can be changed during treatment. There is evidence that MBSR and meditation practice have effects on the making up the attention, and perceptive control abilities have effects on negative rumination (Ramel, Goldin, Carmona, & McQuaid, 2004), focused attention (Philippe Goldin et al., 2009) and emotional orientation and regulation (Jha, Krompinger, & Baime) following by mental flexibility and making the individual able to get rid of annoying stimuli (Lutz, Slagter, Dunne, & Davidson, 2008). On the other hand, several studies considered the impact of MBSR based on the pattern of brain activity. In this regard, to identify the neural patterns associated with symptoms, methods such as brain anatomical and functional imaging (fMRI and fcMRI) have been used. These findings show hyperactivity in brain regions related to the immediate emotional reactions in people with social anxiety disorder. The studies have reported numerous inadequacies and dysfunctions in the dorsolateral and medial frontal cortex, posterior cingulate, inferior parietal lobe and supramarginal gyrus (D. J. Stein, Ives-Deliperi, & Thomas, 2014). A number of other studies emphasize the impact of mindfulness exercises on the left frontal lobe area that seems to be associated with emotion regulation (Davidson et al., 2003). The people their brain activity pattern is higher in these areas are less affected by stressful events. Moreover, based on evidence, pre-frontal areas responsible for decision-

making, reasoning and emotional feeling is thicker in those who have conducted mindfulness exercises regularly. Davidson argues that the practice of mindfulness can affect the frontal area of the brain, which performs full processing and influences different areas of the brain and body (Kring, 2012). In 2011, Kilpatrick et al. showed that MBSR subjects have altered intrinsic functional connectivity in ways that may demonstrate a more consistent attentional focus, enhanced sensorial processing, and intellectual awareness of experiences (Kilpatrick et al., 2011). So, a lot of evidence about the neuropsychological patterns, reminds us that MBSR can affect the brain, functionally and anatomically. However, fluctuations and shortcomings in results should not be ignored. In explaining the psychological mechanisms underlying the MBSR program, several authors have studied the effects of mindfulness practices on cognitive-based processes and have tried to explain the potency of this method with the help of evidence from meta-cognitive theories. For example, Clark and Wells (Clark & Wells, 1995) expressed the assumption that people with social anxiety, create their assumptions about their social status based on their initial experiences. Thus, they assess communal interactions as scary and negative events. So, if people with SAD can face the assumptions about themselves and their situation without judgment through therapy, they will be more comfortable with the position of fear, eventually leading to reduce of their symptoms. Some other studies argue that in social anxiety disorder, avoidance behaviors appear as narrowly avoidance in all aspects of life (e.g., relationships, career, health, etc.). Kabat-Zinn believes that mindfulness makes it very flexible and more accepting in affected people (Kabat-Zinn et al., 1992). In addition, the acceptance can be considered as a mediating factor in the relationship between social anxiety and behavioral disturbances. High levels of acceptance among people with social anxiety lead to admitting any anxious thoughts and feelings and not trying to control or avoid them, and it reduces confusion and dysfunctions (Herbert & Cardaciotto, 2005). As the current research findings suggest the effect of MBSR to reduce symptoms of social anxiety and increase the mindfulness variables, it can be emphasized on the targets this program aimed to explain. Based on the contents of the MBSR sessions, therapist prefers to decouple from the thoughts while seeing them objectively. It is therefore expected that mindfulness-based stress reduction program would cause results, which are: Create a Meta-cognitive insight, where, thoughts are not considered as the representation of reality and are intended to be seen only as mental events that can be evaluated or corrected; Freedom from worrying strategies that are derived from maladaptive ideas; Flexible responses to threats; Develop techniques to control cognition (Wells, 2002).

On the other hand, it seems that mindfulness with its two fundamental components, attention to current experience and openness to the experience, provide the ability to recognize nonjudging thoughts, feelings and emotions without the person being involved or to avoid it, and this leads to the emotional stability. So the effect causes reducing the symptoms of anxiety and fear and deal with stress in a constructive way. If people are mindful about their reactions to stressful situations (such as public speaking, etc.), they will learn how to respond to it in a more productive and coordinated way (Stahl, Goldstein, & Kabat-Zinn, 2010). This is especially true in studied cases and cannot be simply ignored. MBSR, for individuals with SAD include to not only focus on how and what is happening now, but all experience covers the present moment. Instead of judging a person's experience, mindfulness practice encourages to accept physical sensations, emotions and thoughts (Koszycki, Bengner, Shlik, & Bradwejn, 2007). Furthermore, in MBSR, people learn a different way to connect with their experiences (seeing the emotions, thoughts and physical sensations, with a receptive and nonjudging view). This progressively makes people aware of their automatic thought patterns (habitual manners are often used in different experiences), and during sessions, they can see how the reaction will lead to continued anxiety and fear. They learn to distinguish between reactions and practiced responses to issues, and gradually replace immediate reactions by

proficient responses (Chaskalson, 2011). So mindfulness is dealing with the issues that lead the person to avoid inner painful experiences (Baer, 2003). Mindfulness can also reduce unsuccessful attempts to avoid or control or suppression of unwanted thoughts and emotions (Roemer et al., 2009). This study has some restrictions such as limited demographic and geographic characteristics, the lack of follow-up and placebo-treated group. The researchers suggested that given the current limitations of this study, future research would check the effects of this treatment program on social anxiety disorder or other clinically relevant cases in a different range.

#### **Conflicts of interest**

The authors have no conflict of interest.

#### **Ethical approval**

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

#### **Informed consent**

Informed consent was obtained from all individual participants included in the study.

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**Table 1 Comparison of the age of the subjects in two groups before intervention**

Indicator	Group	Number	Mean	S. D	Total rank	Mean rank	Z	Significance level
Age	Experimental	10	21.5	2.17	113.5	11.35	0.251	0.802
	Control	11	21.18	2.22	117	10.68		

**Table 2 Comparison of social anxiety and mindfulness of the experimental and control groups before intervention.**

Scale		Indicator				Comparing the experimental and control groups			
		Group	Number	Pre-test mean	Pre-test S. D.	Total rank	Mean rank	Z	Significance level
Social Phobia Inventory (SPIN)	Fear	Experimental	10	12.4	4.03	114	11.40	-0.283	0.777
		Control	11	11.63	4.88	117	10.64		
	Avoidance	Experimental	10	14	3.62	109	10.95	-0.035	0.972
		Control	11	14.54	5.18	121	11.05		
	Physiological symptoms	Experimental	10	9.6	3.13	134	13.4	-1.709	0.087
		Control	11	7.36	3.55	97	8.82		
SPIN Total score	Experimental	10	36	9.8	118	11.58	-0.601	0.548	
	Control	11	33.54	11.72	112	10.23			
mindfulness questionnaire	Observe	Experimental	10	24.8	3.76	112	11.2	-0.141	0.888
		Control	11	24.63	5.74	119	10.82		
	Describe	Experimental	10	22.3	7.05	92	9.25	-	0.217

		Control	11	25.9	5.68	138	12.59	1.235	
	Act with Awareness	Experimental	10	22.9	5.66	92	9.20	-1.274	0.203
		Control	11	26.27	5.17	139	12.64		
	Nonjudge	Experimental	10	20.2	5.09	102	10.20	-0.565	0.572
		Control	11	21.81	7.26	129	11.73		
	Nonreact	Experimental	10	19.2	4.13	129	12.9	-1.350	0.177
		Control	11	17.63	3.52	102	9.27		
	FFMQ Total score	Experimental	10	109.4	18.68	98	9.80	-0.847	0.397
		Control	11	116.27	14.65	133	12.09		

**Table 3 Descriptive indicators related to the five-facet mindfulness questionnaire (FFMQ) of participants in both the Experimental and control groups before and after the test.**

Group	Subscale	Stage	Indicator					The mean of the differences between pre and post-test scores	The standard deviation of the differences between pre and post-test scores
			Mean	Standard Deviation	Minimum	Maximum			
Experimental	Observe	Pre-test	24	3.76	20	31	-5.00	3.74	
		Post-test	29.80	2.65	25	34			
	Describe	Pre-test	22.3	7.05	12	32	-4.50	4.52	
		Post-test	26.80	4.58	20	33			
	Act with Awareness	Pre-test	22.9	5.66	13	31	-4.90	5.54	

		Post-test	27.80	2.93	23	31		
	Nonjudge	Pre-test	20.2	5.09	13	27	-7.00	5.24
		Post-test	27.20	4.21	21	33		
	Nonreact	Pre-test	19.2	4.13	12	25	-4.10	6.04
		Post-test	23.30	2.79	18	28		
	FFMQ Total score	Pre-test	109.4	18.68	75	142	-25.50	20.57
		Post-test	134.90	9.89	122	152		
Control	Observe	Pre-test	24.63	5.74	17	34	0.72	3.60
		Post-test	23.90	5.64	16	35		
	Describe	Pre-test	25.90	5.68	14	34	0.45	2.80
		Post-test	25.45	5.76	11	34		
	Act with Awareness	Pre-test	26.27	5.17	18	36	0	2.10
		Post-test	26.27	4.98	17	34		
	Nonjudge	Pre-test	21.81	7.26	10	35	1.54	3.11
		Post-test	20.27	6.05	10	28		
	Nonreact	Pre-test	17.63	3.52	8	21	1.18	3.42
		Post-test	16.45	3.53	10	22		

FFMQ score	Total	Pre-test	116.27	14.65	92	140	3.90	7.62
		Post-test	112.36	13.48	83	132		

**Table 4 Comparisons of mindfulness variable in the experimental and control groups based on Mann-Whitney U test scores before and after the test.**

Scale	Group	Indicator				
		Number	Total rank	Mean rank	Z	Significance level
Observe	Experimental	10	69	6.90	-2.907	0.003
	Control	11	162	14.73		
Describe	Experimental	10	74	7.40	-2.548	0.010
	Control	11	157	14.27		
Act with Awareness	Experimental	10	73	7.35	-2.582	0.008
	Control	11	157	14.32		
Nonjudge	Experimental	10	66	6.60	-3.110	0.001
	Control	11	165	15		
Nonreact	Experimental	10	76	7.65	-2.367	0.016
	Control	11	154	14.05		
FFMQ total score	Experimental	10	67	6.70	-3.032	0.002
	Control	11	164	14.91		

**Table 5 The results of pre-test and post-test percent variation in the experimental and control groups with respect to five-facet mindfulness questionnaire(FFMQ)**

Scale	Indicator						
	Group	Number	Pre-test		Post-test		The mean of change percent in group
			Mean	Standard deviation	Mean	Standard deviation	
Observe	Experimental	10	24.8	3.76	29.8	2.65	-22.01

		Control	11	24.63	5.74	23.09	5.64	2.19
Describe		Experimental	10	22.3	7.05	26.8	4.58	-27.67
		Control	11	25.9	5.68	25.45	5.76	1.80
Act with Awareness		Experimental	10	22.9	5.66	27.8	2.93	28.07
		Control	11	26.27	5.17	26.27	4.98	-0.46
Nonjudge		Experimental	10	20.2	5.09	27.2	4.21	-41.46
		Control	11	21.81	7.26	20.27	6.05	5.43
Nonreact		Experimental	10	19.2	4.13	23.3	2.79	-29.51
		Control	11	17.63	3.52	16.45	3.53	4.44
FFMQ total score		Experimental	10	109.4	18.68	134.9	9.87	-26.68
		Control	11	116.27	14.65	112.36	13.48	3.14

## Examining the rational and theological implications of the Holy Quran

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### Abstract

The main question of the research is whether the topics of the implications in logic conform to the verses of the Holy Qur'an? Considering the amazing eloquence of the word of revelation and the profound and profound meanings of these words and the fact that the Qur'an is one of the main sources of deducing judgments, the question is whether one can use logical implications in understanding the meanings and purposes of Quranic verses.

In this paper, we tried to apply logical rules in the discussion of intellectual and moral implications in a deep understanding and a better understanding of some of the verses of the Holy Qur'an, in the hope that other rational topics such as the arguments of the stewards and nonhuman arguments, such as types The contrast between the images and the images of contradiction, analogy, induction and allegory, as well as the speculations of argumentation, argumentation, and fallacy and ... are also carefully investigated by the researchers and researchers of Ahriman in the Quranic verses of the Holy Quran.

**Key words:** logic, signification, rational, natural, holy Quran.

### Introduction:

The Holy Qur'an, as the last book of the heavens, has provoked the efforts of various scholars with different approaches to reach its high concepts and its proximity to its field. This Bible is one of the two main sources of pure Islamic teachings and divine revelations, which is the revelation of the 23 years of the Prophet's relationship with the Almighty Allah and, based on the research of Islamic scholars, is the only book that has been most written and researched about it.

Logic is one of the pivotal and influential scholars of Islamic sciences, which is responsible for introducing the correct way of thinking, and since the operation of thought in all the knowledge is the key to the desirable course of action, one can use logic as Fundamental to the development of various sciences. In addition to this universal and universal effect, the logic of science, by exposing the innumerable capacities of the mind, and strengthening humanity, in the use of the power of reason, provides the highest service to rational knowledge.

#### 1- Signs of the sign

There are three basic pillars in every aspect:

A-Dahl

B- Relevant

C-Subjective transmission (ie, knowledge of the existence of the relationship between the two)

Like when we hear the sound of impacts in the room, it quickly becomes clear that someone is behind the door and understands that he wants to enter the room.

Transmission is a semantic word, and the relation between two things, and the meaning of words, requires both sides, and these two sides must have a nominal and independent meaning.

It is not that from science to the existence of anything, the science of the existence of something else can be obtained, but it is not that we refer to any subjective transmission of the existence of something to something else.

For example, it sometimes takes years for someone to conclude, by reason of science, that there is something else.

We do not deny this. It also means that the transfer of mind from slab to signifier occurs quickly, but without distances.

## 2- Kinds of implications

### 2-1. Rational signification

In the event that there is an inherent relationship between the sign and the signifier, in such a way that one is another reason, then the implication is rational. From the sample Bob, the sound of a sound from the back of the wall implies the presence of speakers behind the wall; his voice is the reason to understand the presence of the sound behind the wall (Healey, 1371: 19).

### 2-2. Implicit

Sometimes the intense relationship between the two parties is not such that intrinsic perception naturally leads to another perception, but with regard to the nature of man, we pass from perception to something to perception of something else. (Muzaffar, 1422: 45)

### 2-3. Conditional implication

The transfer of sign from sign to signifier is not a thing of the past, but a contract that humans have made to meet their needs. Of the sample, humans use words or phrases, in other words, sounds and signs to express their intentions. Therefore, whenever the word or sign is such that the knowledge of the issuance of it by the speaker or the writer, science is meant to mean, it is called a conditional sign, which is twofold. (Ibn Sina, 1367: 195)

## 3- Review the rational implications in Quranic verses

A. In verse 2 of Mobarakeh Rada:) It is Allah who raised the heavens without pillars that you see. Then He willed to the Throne and subjected the sun and the moon, each pursuing an appointed course. He directs the affair. He makes plain His verses so that you will firmly believe in meeting your Lord (

Allah Almighty uses some kind of signs and signs in nature such as the heavens, the sun and the moon, and uses them as a sign of the signification of the existence of the resurrection and the guidance of the Lord In particular, by referring to the regular flow of the circle of the sun and the moon, as well as the existence of invisible columns between the earth and the sky, which today's science translates into Newton's law of gravity, or the gravity of the earth, addresses the human intellect one day The moderator will meet these signs and signs.

B- In verse 164 of Sura of Mobarat Bagheri:( In the creation of the heavens and the earth; in the alternation of night and day; in the ships that sail upon the sea with what is beneficial to the people; in the water

which Allah sends down from the sky and with which He revives the earth after its death, and He spread in it from each moving (creation); in the movement of the winds, and in the clouds that are compelled between heaven and earth surely, these are signs for people who understand)

In this verse, referring to the creation of the heavens and the earth, the regular difference of night and day, and the movement of ships on the sea and the descent of rain to revive the earth and the movement of wind between heaven and earth from the order of all these natural affairs as verse and It serves as a sign of the use of the wise man, and at the end of the verse this rational signifies for those who are understandable and accepted in their minds in the creation of the creatures of God.(Tabatabai, 1417 AH, 1: 274)

C. In verse 65 of Mobarakeh Al-Imran's Sura): People of the Book, why do you dispute about Abraham when both the Torah and the Gospel were not sent down till after him? Have you no sense?()

In this verse, to those of the Jews and Christians who each name Abraham as their followers of religion, he argued that the sinking of the Book of the Torah and the Gospel is located after Abraham, so he is not Jewish and Christian. At the end of the verse, he blames the use of thought and thought, and says, "Why do not you think and reason.

D-103th verse of Mobarakeh Nahl:) We know very well that they say: 'A mortal teaches him. ' The tongue of him at whom they hint is a nonArab; and this is a clear Arabic tongue.()

In this verse, the Almighty God, in answer to the idolaters who say that the Qur'an is taught to the Prophet, human beings argue that the language of man is dysfunctional while the Qur'an is not in Arabic in Shiva and the word is human.

#### 4. Review the implications of the Qur'anic verses

A. In verse 58 of Mobarakeh Nahl's Sura) When good news of the birth of a female is given to any of them, his face grows dark and inwardly he chokes()

The sign of the blackening of the facial expression is the fact that he is aware of the birth of his daughter's baby as a kind of implication that affects the intensity of the anger and sadness of the alphabet, which is mentioned at the end of the verse. The beautiful expression of the Qur'an in bringing the concept of the intensity of anger in the form of a change in the color of the face establishes the relation between the sign and sign in the minds of the audience based on the requirements of human beings, which is the same signification of the body.

B. In 19th chapter of Baghera: )Or, like (those who, under) a cloudburst from the sky with darkness, thunder and lightning, they thrust their fingers in their ears at the sound of every thunderclap for fear of death, and Allah encompasses the unbelievers()

Fingering of the fingers in the ears by humans when they hear the thunderous sound of the implications of the nature that in this verse Allah Almighty portrays the scene of the fear of the infidels of death while watching the divine retribution as human beings see this scene in front of their eyes. They understand the day and night well.

C. In verse 7 of Mobarakeh Surah Noah:) Each time I called them so that You might forgive them, they thrust their fingers in their ears and wrapped themselves in their garments, and persisted becoming very proud()

The people whom Noah invited them to believe in their failure to admit him to the implications of his fingers in their ears and to put on their clothes, indicating their unwillingness to hear the voice of Noah and to provoke them to invite the truth made.

D-119th verse of Mobarakeh Al-Imran: (There you are loving them, and they do not love you. You believe in the entire Book. When they meet you they say: 'We, believe. ' But when alone, they bite their fingertips at you out of rage. Say: 'Die in your rage! Allah has knowledge of what is in your chests)

In this verse, the human implications are used to show the intensity of anger and anger of the infidels, it is to tear the fingertips of the slab to the rage of infallibility and the indignation of the infidels, which is well depicted in this scene from the implications of the verse for the audience.

#### **Conclusion:**

The Holy Quran has used intellectual and social implications for understanding and achieving its high goals. Therefore, Islamic scholars can prove the rational and logical aspects of this Bible with the instrument of science of logic as the servant of science, and with the expressive and It is obvious to the world that Islam is not the religion of violence that is not illegal, but it is a religion of wisdom and logic.

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