Cooperative Research Projects of Master's Students (Education Programs) in the Open Informational Educational Environment

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ABSTRACT

Relevance of the research problem stems from the need to meet the challenges of personal growth of each participant of the educational process, a productive exchange of information and personalized contribution to the overall result of the conducted educational research. The aim of this paper is to improve joint training activities as the basis for future studies of masters that will be implemented in an open information and education space. The key approach to the study of the problems of the joint educational researches relies on the conceptual ideas of experiments conducting in joint environment in which access to individual and shared data in an open information education environment is restricted. Theoretical and technological tools were developed for working with factorial data of collaborative research in open educational environment. As a result these conceptual ideas were formulated for joint training of master's studies: the stages to improve joint research activities were grounded, the technology of forming joint bank of comparable research materials was created, the system of algorithms for collaborative (joint) working with experimental data was proposed, the strategy ensuring the adequacy of the joint pilot materials for attaining general and private purposes was worked out. This strategy also should be applied to the value and usefulness of collected data. The collected, studied, processed and presented in the paper unique experimental material can be useful both for solving current individual research tasks of undergraduates and for the development of new roles in research.

Keywords: cooperative research projects, open educational informational environment, masters' programs

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State of the literature

- The increasing complexity of the tasks of the informational age is reflected in the collective works of many experts. However sufficient attention in the modern theoretical and experimental literature has not given to the problems of formation in the educational process experience required in sharing comparable research material
- Master's studies obtain a lot of experimental data which can be found in the literature but questions of the systematic integration of their dynamic and personalized features are required a separate research
- The vast majority of publications on the organization of graduate/masters studies reveals their specificity defined by directions of their training and disciplines studied by them that virtually eliminates conversation on organizational and technological issues of rhythmical and mutual data exchange

Contribution of this paper to the literature

- The conceptual ideas of joint training of master's studies were formulated. These ideas aim at communication and cooperation experience formation that is needed for setting and solving the complex problems of the modern era. These ideas are disclosed in theoretical and experimental justification of steps taken to improve joint research activities and algorithms of data sharing
- The complementary successive stages were defined to improve masters' joint research in specially organized open information environment. These stages provide timeliness and cadence of joint work, adequacy of experimental materials to objectives, diagnostic value and usefulness of the collected data
- Algorithmic tools of collaborative research in an open educational environment were experimentally proved. These tools include such groups of algorithms: a) algorithms to enable personalized meta-information dynamics in space of research data, b) algorithms of generation and multifunctional use of comparable research materials, c) algorithms to search positive experience and successful strategies in all research groups d) algorithms of successful strategy for dynamic promotion of total positive research experience

INTRODUCTION

The relevance of this study is substantiated by the need for training that aimed at research productivity in obtaining master's degree. Productivity of educational researches conducted by undergraduates is treated in this paper from the standpoint of their personal growth.

It is noteworthy that personal growth is considered not only in attaining of personal goal but in context of individual participation in obtaining the public meaningful result. In connection with the increased complexity of modern research tasks allowing to attain the significant achievements in science and practice are more and more frequently become as a result of collective work. That's why a process of educational activities should include joint research

work. Moreover, the possibility of using the obtained results are directly related to their placement in an open information space.

Accordingly, in the educational process it becomes relevant for masters of pedagogical professions to accumulate not only their own research experience but the experience of the joint educational research and proficiency in posting results in an open informational educational space.

In this work the authors seek to explode the issues of joint training research of postgraduates in pedagogical branch with focusing on organizing of an informational data exchange and fixation of personalized input in the overall scientific results in an open informational educational environment.

In theoretical terms as shown in this article a selection of issues and ways to study the transferring of teaching and research activities of masters from individual to individual-group work becomes very relevant. During the work the specificity of joint training research conducted by postgraduates of pedagogical branch was revealed from the perspective of the priority of synchronous and rhythmic work of all participants in the joint study. In this article authors during conducting and description of their study sought to consider and disclose the positive and problematic sides in pilot educational process. In terms of joint training and research activities organizing in an open informational educational space the significant conceptual ideas are presented that were mostly dedicated to information security of experimental data joint cyberspace within which the access to individual and public data was restricted.

LITERATURES REVIEWING

During writing of this article, we used ideas and results presented in writings published by scientists and practitioners in scientific journals. We take into consideration the ideas of «theory of human motivation» and ensuring personal growth based on them which are related to each other and are arranged in a hierarchy of prepotency (Maslow, 2003). It is said in them that when the most desired goal has been achieved the next higher need emerges.

With issues of motivation we echo the basic ideas of the quality of life which still form the basis of the most coherent theory and provide a base for more actual studies in which happiness and true being of person are disclosed in getting a worthy result (Ventegodt, Merrick & Andersen, 2003).

Public importance is linked to the collective nature of human activities ways of monitoring manifestations which are described in materials of the case study method (Yin, 2011). This is useful as the examples for a wide range of individual researchers. The ideas of placing one's own experience take an important place in an open-ended and collaborative learning environment implemented from the standpoint of applying theory of artificial intelligence in education (Ogata & Yano, 2000; Santos, Azevedo& Pedro, 2013). On the basis

of such an open environment the awareness of the knowledge and experience of each individual user could be provided as mentioned by Anand, Manz, & Glick (1998) and empowerment of one's abilities within the framework of cooperation that was stated in works of Israel, Checkoway, Schulz, & Zimmerman (1994) and is implemented in an organized system of autonomous agents storing and representing the achievements of the people by the means of informational knowledge bases (Barbuceanub & Fox, 1995).

The issues of cooperation in joint research of undergraduates including teachers' involvement in undergraduates' works become important because of enriching a practice of learning and thinking (Chun, 2010). Organization of interactions requires the use of conceptual ideas of data protection in a joint experimental data cyberspace (Chen & Zhao, 2012; Duri et al., 2004). The typical system that requires privacy protection is an open educational environment that contains information about students and their personal results (Yoon, Hwang & Kim, 2012). Solving of emerging issues is possible by means of use of the special techniques and technologies as well as by keeping up mutual agreements and organizational discipline (Hara et al., 2003).

The work also relies on methods described in the literature of experimental data processing on the basis of which the recommendations were prepared for participants of joint research. Primarily it is the works in the field of statistical analysis of experimental data used extensively in laboratory situations of minutely precise measurements (Mandel, 2012). Digital statistics consultant described in literature is characterized as clear and fascinating. So it becomes possible based on the notion of qualitative information to extract dynamics from experimental data and use system analysis on it (Broomhead & King, 1986).

Finally, it is necessary to note the group of literary sources disclosing disciplinary categories, majors, and undergraduate academic experiences. In some works important for this paper the research conduct of students reveals confirmed within long-term experience (Brophy, 1986). In another series of works of Brint, Cantwell & Saxena (2012) were discussed modern achievements of research made by students of humanities and social professions in comparison with the achievements of students in the sciences. A special place is occupied by instructional materials as mentioned in works of Cobb, Zhao & Dean (2009) revealing the evidence-based strategies for improving student performance (Schraw, Crippen & Hartley, 2006).

Theory and technology of personalized learning system equipped with the mechanisms of the meta-analysis of personal data of the achievements described in the works of Kulik, Kulik & Cohen (1979) and the works of Rosenberg (2005) are closest to authors attitude. In that article authors enrich mentioned above theory and technology with implementation of phased algorithm to improve joint research of masters, solving more complex modern information-oriented educational tasks (Hubwieser, 2012). Diane, Angelo & Cross (1995) in their works addressed to such factors as rhythm and regularity and it was mentioned that in line with them multiple cognitive operations are running (Salomon, 2016).

The first and most important of which for the implementation is a clear planning of someone's own study.

RESEARCH DESIGN

The purpose of this article is the gradual organization and approbation of the ways, means and results to improve joint research masters of pedagogical branch in open information education environment.

The main objectives were identified as follows: exploring the challenges and opportunities for the establishment and functioning of an open information educational environment for research activities; analysis of prevailing and emerging features of productive joint research masters in pedagogical branch; selection stages to improve joint research masters in an open information educational environment, pilot testing to improve masters research using algorithms of work with factual data providing a dynamic personalized meta-information in space research, creating and multifunctional using of comparable research materials for finding positive experiences and successful strategies in all research groups.

EVALUATED MEASUREMENTS

The authors of the article echoed the ideas of meta-analysis and application of statistical methods used by Kulik, Kulik & Cohen (1979) which is designed to draw reliable and general conclusions from the diverse and voluminous information.

Special attention was given for studying rhythm and regularity in educational process described by Diane, Angelo and Cross (1995) and experimentally measured data shows us how regularly students studied and prepared for their graduation work.

In addition, previous experience was significant as mentioned in his works G. Salomon (2016) including the lessons learned in computer based teaching, so in this work the experience of development of cognitive operations previously carried out by undergraduates was measured and assessed.

Finally some ways were described in works of Carver, Chatterji, Kraft, (2016) to determine the usefulness of empirical master's studies.

In practical terms a set of generic algorithms was proposed for synthesis of previous experience and for collection and processing of experimental data. An individual nature for replenishing of proven by experiments instructional materials remains significant but individual experience complemented greatly. So, the undergraduates not only get their own experimental data but track the success of various research strategies that has been proposed in their group (Daniels et al., 2010). As a result, they learn by their own experience as well as by a positive experience aggregated within an entire group (Zeiner et al., 2016). In addition, a new experience is obtained by them in communications and cooperation in the process of carrying out analytical and research projects by refining algorithms of work with data factual

tools for collaborative research in an open educational environment. Set of algorithms includes: algorithms to enable dynamic personalized meta-information in space, research data algorithms of generation and multifunctional use of comparable research materials, algorithms to search of positive experiences and successful strategies in all research groups.

The study conducted by Kirilova& Vlasova (2016) involved 150 undergraduates of pedagogical branch that studied in 2016-2017 school year in experimental groups Kazan Federal University and used the created for them an open information education space (environment).

Each member of the experimental group was to draw up their own research materials and incorporate them into group questionnaire, organized as the digital document. Created by this way digital form was offered to numerous respondents'. Homogeneous composition of respondents answering to created digital form makes the information comparable. So all the same respondents answered to all questions created by a certain master group, that provides not only the individual processing of survey results but a comprehensive analysis of information obtained by all members of master group.

Issues of implementing an open information educational space in which postgraduates' joint researches are carried out have some specificity. This specificity was explored in different stages and involves: a) a conscious shift to rhythmic work, b) previously existing experience creating questionnaires, c) analysis of the usefulness of experimental materials. Accordingly identified the stages that ensure timeliness and cadence collaborate of joint studies, the adequacy of the experimental materials to objectives in view, diagnostic value and usefulness of the collected data.

Let us explain step-by-step implementation of each of the selected specific aspects and the dynamics of the accumulation of positive experiences, presented in **Table 1** (in brief).

Table 1. Dynamics of the accumulation of positive experiences

		At the beginning of experiment		During the experiment	
		quantity	%	quantity	%
I. Rhythm	At night	27	(18%)	3	(2%)
	In time	114	(76%)	141	(94%)
II. Typology of answers	Answer yes/no	48	(32%)	6	(4%)
	Entering of text	39	(26%)	9	(6%)
	Multiple answer	18	(12%)	54	(36%)
	Complex(grid/scale)	3	(2%)	48	(32%)
	Other	42	(28%)	33	(22%)
III. Usefulness of results	Obvious result	42	(28%)	12	(8%)
	Diagnosable result	18	(12%)	111	(75%)
	Valueable scientific result	3	(1%)	24	(16%)
Quantity of masters (undergraduates)		150 people			

The first phase focuses on the timeliness and cadence of collaborate work. In the first phase a group of undergraduates works in joint experimental data cyberspace. The open nature of the preparation and conduct of the survey and its public discussion leads to self-control and mutual control and improves the quality of research material and their interpretation. As stated above as a result undergraduates learn on his own and integrative positive experience.

Implementation the first steps of the scheme greatly affect the timing of preparation and quality of interviews conducting. In the early days of the experiment a noticeable part of masters (18%) continued to work late at night, to keep pace with the overall schedule. However, during the first month almost all (except 2%) were able to organize their work during the day and evening. In the experimental groups 94% of undergraduates (instead of 76% in the beginning of the experiment) had passed deadlines. While undergraduates are increasingly involving in the activities to be undertaken by the joint experimental activities schedule.

The second phase focuses on the adequacy of the experimental material to objectives in view. At the second stage quality of the experimental materials is provided and assessed. Subsequent experience training pilot materials received after the first month were noted to have a positive dynamic. Positive results are evident in the use of a more adequate structure of questions included in a unified database of collaborative research. Firstly, there has been a cancellation of primitive forms of questions, including for example: a) an affirmative or negative choice of answer to a question (the frequency of this type of experimental materials has dropped from 36% to 4%), b) entering of judgment in free-form, that can be use in-automated processing (frequency of this type of experimental materials fell from 26% to 6%). Secondly, the preference will receive comprehensive contingency judgments (the frequency of which increased from 12% to 36%) and questions presented in the form of a scale to build a single ranking of preferences for a series of time intervals of the levels of training (the frequency of such integrated forms increased from 2% to 32%).

Finally, the third stage focuses on diagnostic value and usefulness of the collected data. The third phase focuses on the usefulness of collected experimental materials. In the initial step of master's research these things were observed: a) a massive confirmation of facts (28% of the experimental materials), b) a low percentage (12%) of valid and reliable data, which can be applied to diagnostic procedures and methods used for creating statistical evidence putted forward by undergraduates hypotheses c) extreme rarity of valuable scientific results (marked only in 1% of research). At this point was taken into account the desire to work on the model, so respectively many model algorithms for successful collecting and processing factual data were suggested to undergraduates.

A potential of open space is focused on operational stimulate the use of and creation of new algorithms with factual data, as evidenced by the successful extraction of large quantities of useful facts. In subsequent series of experimental data collection were noted: a) refusing for confirmation of the obvious facts that presents now only in 8% of

undergraduates, b) transition to the collection of data suitable for application to diagnostic procedures (75%) that enable to confirm or deny the initiative hypothesis, c) experience in obtaining in training study new and valuable for science results (16%). Consequently a unique experimental material was collected, examined and processed by that can be useful for addressing individual research tasks, and for developing new research roles.

CONCLUSION AND RECOMMENDATION

Let us show some studies that solved similar problems. It should be noted that works of Serow (2000) and works of Brint, Cantwell & Saxena (2012) in which research postgraduates activity was discusses and was taped the specificity of these studies defined by the selected directions of preparation and studied disciplines. However, the joint activities of the masters in the works not investigated adequately.

Various aspects of mindfulness were described in the papers written by Jordi (2011) and Hamilton, Nussbaum & Snow (1997) while some of its aspects are revealed in pilot training. But mostly awareness have been investigated in people with disabilities, and notes that in matters of conscious behavior is not always easy to spot the difference between norm and pathology. This study compares the different modes of rhythmic work in the educational process and assesses a deliberate choice of the specific learning strategies.

The article draws attention to the issues of productivity in joint research and fixing of personalized input result in the joint masters in educational research. However such specific indicators of productivity and mechanisms of analysis of dynamics of personal and general results of joint master's studies require additional disclosure in the following publications.

We believe that it is important to show the problem occurring in the experiment, which has been linked to various stereotypes of masters research organization and expressed in a slow startup of a number of studies. The main research team of masters easily coped with the tasks and quickly moved forward. We had to create separate teams of "latecomers", who are not provided in time materials of research on their tasks and had not had time to gather the necessary data from respondents. Such participants received additional time to perform the first study on samples to lay in an open information educational environment and to compare progress and research results in an open debate.

The total cost of time and effort in groups of "latecomers" significantly exceeded the specified options when they reach the results of lower quality. The obvious benefits of joint and timely activities led to further compliance with the required graphics and allowed masters to rhythmicallyobtain high quality research data and useful research results. All this was reflected in the diagram in this article proposed joint master's research, which, at the stage of pilot data collection and processing is now also implemented banks function in an open joint study information and education environment. It will be also interesting to further trace the reflection of productive experience of joint research conducting by masters of pedagogical branch in their future scientific and educational activity.

Accordingly one of the main forms of masters research is considered as joint training activity. In this context, the application of an open information educational space becomes unique to this article for joint individually-group training research postgraduates, which aims to organize information exchange data.

The further work with masters can bring an interesting result in the field of their dynamic involvement in a newly created content, adoption of new role-playing functions involved an analysis, citation and reviewing at the level of one or more academic disciplines, at intergroup level, levels of educational communications and institutional and scientific cooperation.

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