

THE EFFECTS OF THE INTEGRATION OF CROWDSOURCING AND NETWORKING IN THE CURRICULA OF RUSSIAN UNIVERSITIES

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Abstract

Today, there is a debate in the Russian academic community about how technology can be used to add value to higher education. Diverse opinions provide a firm insight into the social nature of technology, while crowdsourcing and networking (C&N) are seen as the major ICT-based tools for preparing students for future life and professional activities. The terms "crowdsourcing" and "networking" are already widely spread in the West, but they are still not well known to teachers and students in Russia and therefore lack proper recognition and use. The concepts are closely interconnected and relate to "mobilizing people's resources through information technology in order to establish interaction to solve problems facing business, state and society as a whole." The development of access to the Internet and telecommunications allows universities to expand the forms, methods and technologies for teaching students, including the integration of crowdsourcing and networking in their curricula to improve and adapt the educational process to the needs and tasks of the 21st century.

The aim of this work is to analyze the best C&N-related practices, strategies and models, and identify their applicability to Russian universities. We studied these technologies in terms of their impact on the educational process and learning outcomes. We found out how crowdsourcing and networking can renew the teaching and learning paradigm and improve the quality of university education. We also examined whether C&N can effectively enrich the university curriculum with real-life and experiential training tools and resources and support various learning needs and styles of Russian students. In addition, we assessed the potential of C&N to change the learning environment at university, which allowed teachers and students to form open online communities, create massive open online courses (MOOCs) and virtual worlds to share ideas, links or materials that would otherwise remain undiscovered.

The methodology of this work rests on a comparative analysis of such theories as behaviorism, constructivism and connectivism. Some of the later developed ICT and web-based approaches of Western and Russian scholars, as well as technical, pedagogical and managerial issues of project-based and experiential methods were also considered. Based on the empirical approach, testing, evaluation and control of the usability, accessibility and safety of some related techniques, tools and resources were carried out. The experimental part of the study aimed to obtain and compare certain relevant data on attitudes, priorities and student learning outcomes in a traditional versus C&N-based university environment. The main result of the study is the design of a C&N-based teaching-learning model that enhances the quality of university education, helps teachers relate the subject matter content to the real world situations and motivates students to engage, interact and succeed.

Key words: university, students, education, crowdsourcing, networking, C&N, technology, interaction.

1 INTRODUCTION

The information revolution, which began in the last decades of the 20th century, led to the transition from the industrial phase to the technological stage of the development of civilization [1]. The new reality contributed to the rapid growth and development of the so-called information society, in which the significant activities of individuals or groups of people began to depend more and more on their awareness and ability to effectively receive, extract, process, apply and exchange information using technologically mediated communication means [2]. Back in 1979, Daniel Bell, a prominent American sociologist and professor from Harvard University, who was considered as the creator of the term "information society", emphasized the importance of information and knowledge for such a community as key factors that positively affect its economic, political and social development. Bell considered information as "data processing in the broadest sense", and its search, storage, use, processing, retrieval and exchange as important resources for intensification of various social processes including

education. Knowledge, according to Bell, serves as a set of statements about the facts and ideas presented in a form of well-considered reasoned judgments or experimental results, being transmitted to other people through the medium of different communication options in a systematic way [3].

The invention of computers, growth in telecommunications, availability, massive character and other features of the Internet reinforced the concept of the "information society" and enriched it with such new but closely related notions as "digital society", "network society", "networks", "network interaction", "networking", "crowdsourcing", "digital generation Z", etc. [1]. If earlier society regarded education as a process of forming the "triumvirate" of individual mind, individual memory and individual knowledge leading to acquisition and development of individual competencies and achievements, today it becomes obvious that in the era of high technologies and rapidly updated information flows, the process of learning and teaching takes on a completely different organization. It changes thinking, poses complex tasks, expands forms and methods, creates new connections and opportunities, offers extraordinary solutions, supported by collective intelligence and network interaction [1].

For young professionals, university graduates, the inability to communicate through networks, lack or poor disposition to collaborate and work in teams may lead to problems in finding a job and can cause a mismatch of their position or create an obstacle to career or professional growth in future [4]. For example, a range of competencies of a lawyer today is so wide that, in addition to a set of certain personal qualities, corresponding to their important social role, and deep theoretical knowledge and skills, traditionally expected from a high-level professional, there are some new competencies that have emerged due to the introduction of information technologies in legal practice, the emergence of new areas and branches of law, the growth of robotics, artificial intelligence, virtual and augmented reality, etc. [5]. In order to live and successfully work in a professional multicultural environment, a modern lawyer must be able to transform legal practice into the tasks of the digital economy, be ready to communicate and offer new creative ideas, demonstrate openness to collaboration in mobile teams and with foreign partners, and apply important updates of professional knowledge into practice [6].

There is no doubt that in connection with all the recent changes in public life, it is necessary to review and update the system of training of future professionals at university level in the paradigm of lifelong learning and with account of the well-established ideas of the theory of connectivism, so that the results of training and education (including key competencies, general professional, real life and soft skills) would be equally recognized both inside and outside the educational settings [7]. Attention, in our opinion, should be paid to such forms and technologies of training as crowdsourcing and networking (C&N). Given that most of the current students are members of the so-called iGen or Gen Z community, known as independent, self-confident and autonomous learners, the question arises if there a contradiction can occur between individual and group approaches to education [8].

On the one hand, Gen Z students prefer intrapersonal, autonomous, and independent learning styles to group work. Being entrepreneurial and tech-savvy adepts of web-based research and activities, they often feel they could easily self-educate with online sources such as YouTube or Pinterest [9]. Indeed, the storage, retrieval, manipulation, transmission or receipt of digital data could be conducted individually. On the other hand, it is not the case with data sharing and exchange. Any interaction, be it virtual or face-to-face, calls for communicative behavior which could only be realized in a group or team. Besides, when studying these students like to do their solo work alongside the others in a social manner. They also like their learning to be practical and hands-on and want their professors and peers to help them engage with and apply the content rather than simply share what they could otherwise find on their own online [10]. Thus, university teachers and professors face numerous challenges today while developing curriculum and instruction programs for Gen Z students [8].

Teachers and educators should take into account all benefits and drawbacks of a digitizing world as well as the most defining characteristics of the Gen Z generation. Most of the commentators admit that Gen Z representatives are increasingly self-aware, self-reliant, pragmatic, innovative, and goal-oriented [9]. Teachers should find a compromise to eliminate the existing contradiction between an individual and group approaches; and bridge the divide between the prevailing conventional teaching methods and techniques and "digital" expectations and needs of Gen Z students. Most importantly, teachers should also seek such methods of training that may help their students to work together thus adjusting them to a teamwork, which is more the norm in any work environment, be it digital or not [8].

2 METHODOLOGY

In our study, we relied on a comparative approach, which allowed us to study, identify and analyze the

best examples, experiences and practices of applying teamwork (collaborative and cooperative) teaching and learning methods and techniques, in particular, crowdsourcing and networking (C&N), in the educational practice of leading universities in the USA and Europe. Collaborative method is used when students team together to explore some significant scientific issue or create a meaningful group project over the Internet [10]. Cooperative learning is an instructional strategy that simultaneously addresses academic and social skills of students who work together in small groups on a structured activity in various modes (student-student, student-students, student-teacher, etc.) and in a variety of environments (face-to-face, synchronous, asynchronous, computer or web-mediated). Crowdsourcing and networking are rather technologies than simply methods that involve obtaining information about best practices from a variety of people to improve the way higher education is distributed [10; 11].

For deeper immersion into the topic, we studied the works of the founder of the concept of "information society" Daniel Bell [3], the authors of the theory for the digital age, called connectivism (denouncing boundaries of behaviorism, cognitivism, and constructivism) George Siemens [12] and Stephen Downes [13], the creators of notions "crowdsourcing" and "networking" (C&N) Jeff Howe [14] and James Surowiecki [15], other foreign and Russian sources. The aim of this work was to analyze the best C&N-related practices, strategies and models, and identify their applicability to Russian universities. We studied these technologies in terms of their impact on the educational process and learning outcomes. We found out how crowdsourcing and networking can renew the teaching and learning paradigm and improve the quality of university education. We also examined whether C&N can effectively enrich the university curriculum with real-life and experiential training tools and resources and support various learning needs and styles of Russian students. In addition, we assessed the potential of C&N to change the learning environment at university, which may allow teachers and students to form open online communities, create massive open online courses (MOOCs) and virtual worlds to share ideas, links or materials that would otherwise remain undiscovered [8].

To determine the level of adaptability and effectiveness of implementation of C&N in the educational process of university as a form of preparing students for their future life and profession, we conducted a comprehensive analysis of the C&N potential in terms of their technical, psychological, pedagogical and institutional features. The study made it possible to clarify the conceptual apparatus, identify most acceptable forms of crowdsourcing and networking for Russia, prepare guidelines for their inclusion in the educational programs of Russian universities for effective use in the process of training students for their professional activities. The experimental part of the study led us to obtain and compare certain relevant data on attitudes, priorities and learning outcomes in a traditional versus C&N-based university environment. The main result of the study is the design of a C&N-based teaching-learning model that enhances the quality of university education, helps teachers relate the subject matter content to the real world situations and motivates students to engage, interact and succeed.

3 RESULTS

Today the terms "crowdsourcing" and "networking" are widely used in the Western countries in many areas, including education. Until recently, these concepts were hardly known to teachers and students in Russia, although gradually they are still gaining popularity. "Crowdsourcing" is literally translated into Russian in two words, namely by "crowd" (as a large group of people) and "sourcing" (as a search for resources). This approach allows us to interpret the general meaning of the word "crowdsourcing" as "the process of collecting resources by large masses of people". "Networking", in its turn, can be defined by the phrase "establishing and developing horizontal connections", which essentially means, "networking and interacting on an equal footing" [16]. These concepts are closely interconnected and, according to Jeff Howe, the former editor of the "Wired" magazine, literally mean, "mobilizing people's resources through information technology in order to establish interaction to solve the problems facing business, government and society as a whole" [14].

The concepts of "crowdsourcing" and "networking" originate from and are based on the fundamental principles of the theory of connectivism [12], the main message of which is the following: teaching and learning in the modern digital era will be successful if people learn to build necessary relationships and connections mediated by common goals and interests aimed at obtaining new knowledge. These objectives are achieved through network interaction, communication and joint activities enhanced by electronic ways of networking and by connecting specialized nodes or information sources [13]. The union of peers connected by common thematic and professional interests creates networks, while the formation of networks leads to the development of each individual participant, as well as the network community as a whole. Success is achieved through group collaboration and cooperation in solving problems, constant exchange of information, quick access to data renewal and personal responsibility

of each participant for creation and placement of materials on the Internet [12]. Moreover, according to James Surowiecki, the author of the book "The Wisdom of Crowds" and founder of the term "crowdsourcing" [15], "any project that is formed by the efforts of brain activity of a large group of people will surely lead to better decisions and results than this would be achieved through the efforts of only one of the members of a group". An example of a group project is the creation of the electronic encyclopedia Wikipedia, articles for which are mainly prepared by volunteers from around the world. They can be teachers and students who want to share knowledge with a large number of people [14].

Western scholars usually subdivide crowdsourcing into two categories: by the sphere of life (social, economic, political, spiritual) and by the type of tasks to be solved (e.g., creating or testing new products or content ("crowd wisdom"), collecting information and opinions, finding a better solution through "crowd voting", fundraising ("crowd funding"), providing financial support for projects ("crowd investing"), etc. [13; 14]. To satisfy their interests and solve problems, people voluntarily unite into network communities of like-minded people, while they do not necessarily know each other personally or live in the same city, country, etc. In addition, these can be people of different sex, age, etc. [14]. The spread of access to the broadband Internet and telecommunications allows universities to expand the forms and methods of preparing and training students through the introduction of crowdsourcing and networking (C&N) in educational process [8]. These goals are being achieved via presentment of general didactical materials, including entire courses on separate disciplines, individual modules, lectures, training exercises, tests, etc., deployed on electronic educational platforms and sites with Open Access and Open Source Software. The source code of such programs is available for viewing, study and alteration, which allows any participant to take part in finalizing open content by correcting errors in it and by using codes to create authoring digital programs or develop new projects [17].

Given the widespread use of the open learning management system LMS MOODLE in educational institutions and constant updating of its software, there are prerequisites for employment of that system as the basis for creating crowdsourcing & networking platforms in any, even regional, Russian university [8]. The educational potential of C&N technologies can simultaneously serve different goals and needs of higher education. Wise and proper use of C&N technologies may improve the content of diverse training programs, enhance the quality of educational process as a whole, and fulfill socially significant tasks through the design and implementation of the C&N-based project work and the like. Groups of subjects of educational process can realize them right on the university grounds in the context of transformation of the Russian economy into a digital one and amid ongoing transition of traditional relationships to network-mediated communication modes based on connections and interaction [18].

Based on the type of tasks to be solved in education, the algorithm and forms of C&N can be different; however, certain elements are always present in network interaction. First, these are common goals, tasks and interests, which mediate the search for the optimal solution. Equality of all participants in the educational process, their skills for collecting, storing, processing and transmitting information through communication channels are also important. Of great importance is the so-called outer reaction to a process or activity ("Feedback") for obtaining various immediate responses and opinions [14]. The result of any academic work, for example, on a module or a particular topic will naturally end with testing of the learning outcomes, where a verification form can be determined by "Crowd Voting". It is important that it creates a collaborative environment that will only strengthen the sense of community.

4 DISCUSSIONS

The analysis of the literature on the topic allowed us to assume that most of the common trends of the 21st century teaching and learning are all ICT-based [16; 19; 20]. E-Learning, web-based and mobile learning and other forms of online education are considered by major universities as clue solutions for continued educational success in a digital era [21]. The other trend is concerned with employment of real world applications, which allow students to apply theories to reality and see them in action [20]. Gamification is also ICT-based with nearly half of the teachers admitting that they have at times incorporated online games into their classroom work [22]. Open source textbooks, massive open online courses (MOOCs), information-sharing platforms are all based on networking, cooperation and collaboration over the Internet [23]. Blended learning, the foremost trend in education, combines online digital media with traditional classroom methods [24]. The other ICT-based trends emerging across the global higher education sector and deserving our attention include mobility, connectivity, openness, virtual worlds, collective intelligence, crowdsourcing and networking platforms [25].

Mobility here relates to the fact that as we move forward, higher education becomes increasingly mobile, resulting in students carrying their university "in their pockets" [16]. Mobile computing devices (such as

smart phones and tablets) become quite affordable, more accessible and easier to use than desktop computers, and provide more than enough functionality to serve as a primary computing device for learning. Many new and innovative education apps are available for a wide variety of uses, such as on-line translators and encyclopedias, or those providing access to archived content in university libraries or course materials [26]. Connectivity is another trend. Whether connecting at home, work, university, on the road or in social spaces, people increasingly rely on "cloud computing" to access their information and communities. Cloud computing quietly unifies content and activity on many devices people use in everyday life. Gradually, many educational applications will also rely on the cloud soon. Learning design will increasingly take account of the potential for "learning locations"; and in this sense, the world will become the global university campus. Increasingly we will see location-based services utilized as key learning tools in higher education. We will see a future manager in a case-study location, a lawyer in the courtroom, a social worker in the community, a nurse in the hospital, an archaeologist in the field, still connected with university resources and a community of peer learners [19; 20].

Openness will bring an explosion of free, online educational resources and courseware. Educators are beginning to explore new models that focus on embedding open resources while still protecting the academic value and acknowledging authorship [27]. Content provided under "some rights reserved" license would allow anyone to use the material however they like, providing they follow the guidelines created by the content creator or provider. Another step to the openness in education is achieved using social media to provide a rich, engaging dialogue between students, teachers and the staff. Many universities are starting to realize how they can add real value to learning and teaching via increasingly open collaboration, cooperation and contribution techniques, which will become a valid, vetted and important part of the process soon [28]. Virtual worlds are virtual platforms that provide avatars with a space to interact. Some are already available, including the well-known Second Life (<http://secondlife.com/>) with thousands of educational experiments available and with more under development. The majority of higher education institutions are undertaking various projects in virtual spaces. The unique opportunities afforded by virtual worlds and other immersive digital environments to do what cannot be done in the real world – enable universities to increasingly use virtual spaces with students and teachers avatars for innovative teaching, learning and research projects [23].

Collective intelligence, "crowdsourcing" and "networking" are all about creating network communities, usually temporary, to contribute ideas, links or materials that would otherwise remain undiscovered. These practices normally involve addressing specific tasks to a broad, loosely defined group of people through an open call on the Internet [14] and encouraging the best-qualified and most creative participants to join the project [28]. Crowdsourcing and networking often fill in the gaps that cannot be bridged by other means [29]. At universities, this is currently taking the form of experimenting with massive open online courses (MOOCs), which offer university-level courses without the need to complete an entire program of studies, and are becoming increasingly popular. MOOCs offer a large number of students the opportunity to study high quality courses online with prestigious universities, often at no cost. Video-based, they offer interaction through either peer review and group collaboration or automated feedback based on objective, online assessments including quizzes and exams. Though they are ideal for independent study and users can select courses from any institution offering them in the absence of entry requirements, MOOCs do not always lead to formal qualifications [30]. This can be considered as a drawback rather than an advantage. In the years to come we will see though many more universities utilizing MOOCs and numerous social networking platforms to share information of common interest. Ideas of collective intelligence, crowdsourcing and networking are a big challenge to traditional system of teaching and learning at university level. However, increasingly academics and educators are seeing the value of exploring C&N ideas for the future science and education [31].

The experience of Kazan Federal University (KFU, Russia) is indicative in this regard. For many years, KFU has been using wide capabilities of LMS MOODLE and motivating teachers to design and create copyrighted electronic programs and courses in it. The content is open for alteration, improvement and adaptation in accordance with the "Generation Z" students' needs and demands [8]. "Gen Z" students are known for using technology from their birth, while their communicative and learning styles are strictly divided into offline and online modes [32]. It was found that the speed of access to information and its exchange in electronic format significantly improves the learning outcomes of university students, while immersion into a familiar network interaction expands options to develop competencies so demanded in their future profession [5]. C&N allow students to enhance their creative potential and become co-authors and even developers of the educational content, while teachers have to remain in place but change their role to "a guide watching from the side and managing students in teams" [33].

Teachers of Kazan University also apply crowdsourcing and networking in classroom studies in a form

of offline preparation of a small group for further work online. The starting point is a detailed instruction of students on goals and objectives. For example, when studying a particular discipline, the following steps are quite essential: initial acquaintance with the program, plan and key requirements for the discipline. Further, the teacher offers the students the opportunity to create their own review of the proposed course's plan and content. This approach allows teachers to save time and not to spend it on facts and data already known to the students. It also allows identifying most interesting themes and topics of study to concentrate efforts on solving complex issues and jointly searching for answers. This approach helps to develop critical and analytical thinking skills, fosters research capabilities, promotes disposition for joint creative work in teams and encourages presentation of the learning outcomes. Though the teacher initially reserves the role of a strategist with a clear plan of action, then he/she intentionally transfers the tactics of training to the students as a tool to achieving their goals [8].

No coincidence that the next step will guide the students to develop criteria-based tools for evaluating their results. Involving students in the design of evaluative tools of their work allows teachers to find out what students really want to achieve as a result of mastering the course (module, topic) and how, in their opinion, the results should be graded (evaluated). In order to solve the problem and stimulate students' creative activity teachers may resort to the brainstorming tactics [17]. Here all participants are free to speak out and offer an unlimited number of proposals, the most successful of which will be selected based on a voting practice (Crowd Voting) [15]. Often, the "Wisdom of Crowd" can create a miracle, and teachers starting the survey or brainstorming do not even expect that in the end they will not only get wide students' support, but will also learn a lot about assessment or evaluation tools [12].

Onwards, if students' choice of the subject matter, content, structure, tasks and evaluating tools within a certain course (discipline) satisfy the general requirements and standards as well as the curriculum, then students are invited to participate in planning and design of the curriculum for the whole semester (term) [8]. In accordance with the federal educational standards and university requirements, students conduct a brainstorming session, which includes three mandatory stages: setting a problem, generating ideas and in the end, grouping, evaluating and selecting the ideas presented. Students' proposals are collected on a common electronic resource, then through collective efforts and with support of the mentor, analysis and discussion are held on possibility of implementing most valuable ideas [5]. By engaging students in this part of their activities, the university administration and teachers show that students are also responsible for their education and learning outcomes. The process of generating collective opinion develops metacognitive skills so necessary for lifelong learning [34].

C&N can also be used in various formats (types) outside university electronic platforms, with the involvement of, for example, third-party websites that have already proven themselves on the IT services market. Since 2006 Thematic Media company successfully implements a Russian-language project in the format of a collective blog "Habr" (<https://habr.com/>), the main purpose of which is realization of the "collective creativity" idea ("Crowd Creation") [13]. This resource with the elements of a news site offers opportunities to create and publish author's materials and other interesting and meaningful in users' view content, e.g., news, analytical articles, translated materials, thoughts related to certain professions, the Internet, business and much more [5]. Authors, be they students or university professors, constitute a single network community. They collaborate and communicate with each other in a virtual space through collective and personal blogs, podcasts, etc. The disadvantage of Habr is, in our opinion, the authorization procedure declared by the site's owner. It includes either open registration with limited functionality or full access to the resource, but at the invitation of other users, which entails some restraints for development and expanding of a community [6].

Another example for embodying the idea of "collective creativity" by Russian universities is the Duolingo website (<https://ru.duolingo.com/>), a free online platform that effectively combines options for learning foreign languages and translation of authentic texts, articles, websites, etc., demanded by the network community. To solve problems of innovative design and research activities and accumulate "Crowd Wisdom", Russian universities are increasingly turning to the resources of the GlobalLab platform (e.g., Global Student Laboratory: <https://globallab.org>), where there are all conditions for networking, crowdsourcing and cooperating for scientists, teachers and students from around the world [6]. All GlobalLab projects are based on the principles of "Citizen Science", a special type of crowdsourcing in education, applicable to various areas of training at university level in a frame of many disciplines (social-humanitarian, natural-scientific, engineering, technical, etc.). Citizen Science suggests that a small contribution by each participant contributes to a qualitatively new knowledge and deep understanding of the phenomenon, which will ultimately lead to a genuine scientific result [36].

This is facilitated, firstly, by strict standards and criteria of scientific knowledge for future collective research, namely: the relevance of the problem, reliability of the hypothesis and methods used, scientific

novelty, rationale for creating new knowledge or developing new technologies, their practical significance etc. Secondly, it is important to attract like-minded groups of professional scientists ("experts") and amateur scientists ("civil scientists"), including students, graduate students, etc., Thus, ordinary citizens can play any role in the project, i.e. be leaders or simply project participants [36]. Collaboration is expressed not only in a form of joint research or experiment, but also via discussions, polls, publications of scientific results in the press, the Internet and peer-reviewed journals, in self-education, advanced training, etc. [36]. Ample opportunities for interaction between people expand the general fund of knowledge, generate and form a "collective intelligence" (Crowd Intelligence), which, in the opinion of J.C. Glenn, inevitably arises as a result of interaction between three groups of complementary relationships: data, information and knowledge; software and hardware; professionals (experts) and ordinary citizens who strive to constantly learn on the basis of "feedback" in order to timely receive new and reliable knowledge for further making better collective decisions [25; 33].

Thirdly, the data and metadata of civil science projects are de facto available to the public, and results of the studies, where possible, are published in the "open access" format. Also, "feedback" is tuned for immediate exchange of information before, during and after the project implementation between the participants, interested members and the public. By default, they all have the right to know how the collected data are used and what results were obtained, as well as what the scientific, economic, political and social effects of the study are [36]. Civil science projects are evaluated according to their scientific contribution, quality of the results obtained, experience the participants have gained, and the extent of impact they have on social development. It is important that projects of this kind require compliance with legal and ethical standards relating to copyright and intellectual property. It involves clear awareness of the policy, data management, agreement of participants on data disclosure, information exchange, confidentiality, responsibility of the parties, etc. [4; 6; 25; 33; 36].

5 CONCLUSION AND RECOMMENDATIONS

The study of the problem allows us to conclude that crowdsourcing and networking in education are not only the effective drivers of teaching and learning but also most important tools for providing cooperation, collaboration, team work and network interaction. In the context of global digitalization and transition from traditional societies to network communities, C&N serves as a building material for socialization and adaptation of students [33]. Network communities initially support various communicative spatio-temporal, subject-subject and subject-object configurations of social relations, which, in their turn, generate network relations [25]. Network community members come together to form networks of users connected by common goals, interests, ideology, traditions, etc. [12; 13]. They exist in constant interaction, which occurs mainly on the Internet and for a certain limited period. A mandatory characteristic of a network community is its participants' awareness of their community, which actualizes their desire to communicate and interact based on reciprocity, trust, solidarity, tolerance, responsibility, democracy, voluntariness and empathy. These qualities are most important for implementing the ideas of "social crowdsourcing", another form of C&N, which may also apply to members of the academic community of universities. This type of crowdsourcing refers to the solution of any problems associated with socially significant issues and the social life of people [25; 37; 38].

The success of C&N in education is obvious and predetermined by their massive, open, technology-savvy and interactive nature. The lack of pragmatism on the part of the participants, their desire to collaborate and interact, a tendency to self-realization and creativity actualize their engagement in the development and creation of new ideas and content that meets the requirements and training needs of both the creators and the entire network of community members. Another important contribution of C&N is its supporting of the transition from individual to group competencies both in educational settings and in the workplace. The value of how people can work in teams is now highly appreciated, and this emphasis on team building qualities should be an integral part of any university learning environment [29; 38]. In order to apply this paradigm to educational institutions and their curricula effectively, it is necessary to create, develop, implement and use methods and resources based on cooperation and interaction, so that they can further be distributed among the peers and supporters [8].

However, C&N also have some drawbacks, including the "facelessness of the crowd", possible copyright infringements, data leakage, not always fair ways of rewarding, etc. [8; 13]. However, our study showed the unlimited educational potential of C&N and the associated forms and methods for teaching students at university. In addition, there are opportunities to study this phenomenon by scientists and innovative teachers. C&N is fully consistent with the current socio-cultural and economic situation in Russia and abroad and gives hope for a revival of interest in the values of higher education.

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