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## Latest tools for the intensification of research and innovations of educational organisations in the digital environment

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**Subject.** Digitalisation of educational organisations' activities is impossible without the intensification of all parties of academic and educational processes. At the moment, the effectiveness of digitalisation of educational organisations depends to a large extent on the effectiveness of the innovative activities of management.

**Purpose.** This paper specifies the range of tools for the development and improvement of the results of research and innovation activities of an educational organisation in the course of its virtualisation, considering all participants of this process.

**Methodology.** In this paper we conducted a critical analysis of the works of researchers indexed in the Scientific Electronic Library by the following research areas: “research activities of educational organisations, digital economy” and “innovation activities of educational organisations, digital economy”.

**Results.** A plan was suggested for the intensification of research and innovations, including all participants of these processes: students and academic staff of an educational organisation based on positive non-advertising mentions in mass media where the educational organisation was named as the current place of employment.

**Conclusions.** Specifying the range of tools for developing the innovations and research results of educational organisations in the course of their virtualisation allowed the authors to differentiate between the concepts of “research activities” and “innovation activities” in relation to an individual educational organisation, emphasise the item “Positive non-advertising mentions in mass media with the educational organisation named as the current place of employment” as part of the ranking system of this educational organisation as a tool for the intensification of research and innovation activities of students and academic staff in the digital economy, and show that the intensification of research and innovations of educational organisations in the digital economy is based on intellectual property items.

**Key words:** digital economy, universities, intellectual property, research activity, digitalisation.

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## Introduction

Innovation activities of higher education institutions within the digital economy are being implemented together with its digitalisation processes. The achievement of target parameters for innovation activities formed by the national higher education rankings requires the development of a range of tools for the intensification of innovation activities. In particular, one of the goals of the National Ranking of Universities implemented in the Russian educational space by the Interfax Group is “improving the competitiveness of the Russian education system, research, and technological entrepreneurship”<sup>1</sup>. According to the authors, issues related to the intensification of the innovation activities of higher education institutions in the digital economy need to be studied and resolved in the context of the digitalisation processes in educational organisations, which represent the implementation of “a set of measures aimed at the achievement of national goals regarding the digital development of the higher education field”<sup>2</sup>. This approach will allow developing effective methods for the intensification of the innovations and research in educational organisations.

The purpose of the study was to clarify the range of tools allowing to improve and develop the results of innovation and research activities of an educational organisation in the course of its virtualisation. The object of the study was the innovation activities of educational organisations, including research activities, implemented as part of the process of virtualisation of assets and management. The subject of the study was the range of the digital environment tools that contributed to the improvement and development of research and innovations results in an educational organisation.

<sup>1</sup> National ranking. Interfax. URL: <https://t.ly/HxPTC>

<sup>2</sup> Education digitalisation. Ministry of Science and Higher Education of the Russian Federation. URL: <https://t.ly/oKQIV>

## Research methods

The study was conducted using the methods of analysis, synthesis, and classification. The study is based on research papers published in the Scientific Electronic Library (SEL), the authors’ experience of interaction with digital educational platforms (Urait digital educational platform<sup>3</sup>, E-library system BOOK.RU<sup>4</sup>, E-library system ZNANIUM<sup>5</sup>) allowing to create and promote intellectual property (IP), as well as the results of activities of educational organisations’ scientific schools that the authors of this study are affiliated with.

## Literature review

To analyse the works published in SEL<sup>6</sup>, we formulated three groups of keywords (Table 1). Some works may be mentioned in more than two subgroups of keywords (column B, Table 1). This does not present a major obstacle to the study.

Subject area “research activities of educational organisations, digital economy”. Based on the results of an expert survey dedicated to the issues of digitalisation of Russian universities, V. S. Efimov and A. V. Lapteva (2018) obtained evidence that the processes of digitalisation in higher education were accompanied by investments in PR and university promotion, collaboration with federal agencies, and investments in digital infrastructure. In the course of digitalisation of universities, human

<sup>3</sup> Urait digital educational platform. URL: <https://urait.ru/info/courses>

<sup>4</sup> E-library system BOOK.RU. URL: <https://book.ru>

<sup>5</sup> E-library system ZNANIUM. URL: <https://znanium.com/catalog>

<sup>6</sup> The criteria for selecting publications for review are the following: (1) the journal is included in the list of the State Commission for Academic Degrees and Titles of the Russian Federation, (2) the publication period is no longer than five years at the time of this study, (3) the keywords of the analysed article correspond to the topic of the study, (4) the number of publications in each subject area is limited (3 articles in each area).

Table 1

*Search results in Scientific Electronic Library*

Subject area keywords	Number of works
A	B
1. Research activities of educational organisations, digital economy	86
2. Innovation activities of educational organisations, digital economy	138
3. Research innovation activities of educational organisations, digital economy	44

S o u r c e: original survey.

capital investments were not considered a priority. According to M. V. Shesterina's assessment (2021), in 2020, 15 % of higher education institutions in the Russian Federation were using federal digital platforms as part of the National Project Education, while in 2024 this value will reach 90 %. As the basis for the development of network structures when implementing the educational process, the author named integration of telecommunication networks of the Russian Academy of Sciences<sup>7</sup> with the federal university computer network RUNNe<sup>8</sup> into the National Research Computer Network of Russia since digital platforms are the ones that ensure the exchange of information and accumulated knowledge. I. N. Molchanov's study (2021) considered the issues of management of the higher education system in digital economy as well as the contribution of educational organisations into sustainable economic growth. The author focused attention on the issue of enlargement of higher education institutions in Russia with the formation of flagship universities and highlighted the importance of training highly qualified specialists in STEM areas<sup>9</sup>. In order to resolve the latter issue, the author studied the experience of using financial support in the form of a scholarship provided in accordance with internal regulations and development priorities of an educational organisation.

<sup>7</sup> RASNET – Russian Academy of Science Network.

<sup>8</sup> Russian University Network.

<sup>9</sup> Science, Technologies, Engineering, and Mathematics for digital technologies and artificial intelligence.

Subject area “*innovation activities of educational organisations, digital economy*”. The concept of “virtualisation of educational organisations” was introduced in the previous work by the authors which means a set of processes of virtualisation of assets, management, and platformisation<sup>10</sup> of educational and managerial processes (Gumerova, 2023. P. 205–206). In this work, intellectual property was studied as the basis for the formation of the university's innovation activities. E. F. Zeer et al. (2020) focused on developing an innovative structural-functional model of the socio-professional development of students' personality based on an educational platform that allows creating individual professional and career development routes. The work of D. P. Danilaev and N. N. Malivanov (2022) studied the features of educational clusters as mechanisms for innovative development of the region, and it was noted that a digital cluster required a corresponding management structure. A “cluster” is understood by the authors as “an open educational system in which the vertical integration of continuing education system items and horizontal structure coordination ensure a high level of organisational combination of their activities” (Danilaev et al., 2022. P. 110–115).

Subject area “*research and innovation activities of educational organisations, digital*

<sup>10</sup> The concept of “platformisation” is used here instead of the concept of “uberisation”, as it better reflects the idea of this digitalisation process without being associated with a certain organisation that was among the first to use a digital platform in its business model (*note by the authors*).

*economy*". L. D. Gitelman et al. (2020) formulated the task and specific features of "advanced management education" based on solutions in the form of technological (digital) platforms that allow "increasing the consumer value of final products and services through scaling innovative business models and component ("modular") implementation of their proposals" (Gitelman et al., 2020. P. 436–437). The conceptual project of a university scientific and educational platform developed by the authors in the form of a decentralised communication network tested at the Ural Federal University showed high effectiveness. The study of R. S. Simak et al. (2022) was focused on the following programmes of higher and further education ecosystems provided by automated workplaces: Assistant and Jupiter, that include such modules as Moodle, control and self-control modules, reports, etc. The effectiveness of the implementation of digital technologies was assessed using the example of the process of generating an educational degree document in the usual mode and using Assistant. The study of N. O. Vasetskaya (2020) considered the issue of formation of cognitive competencies in students of higher education institutions using NBIC technologies<sup>11</sup>. The author noted that the priority task at universities should be "not the transfer of knowledge from the teacher to the student in the form of information but explanation of the methodology of individual knowledge acquisition (as information tested in practice), i. e. active methodologically supported search" (Vasetskaya, 2020. P. 105).

Thus, the development of digital educational platforms leads to the formation of digital ecosystems. Jacobides et al. (2018) stated that the modularity of digital ecosystems allowed many different but interconnected organisation to coordinate their activities without a strict hierarchy. Mody et al. (2020) identified three types of digital platforms: platforms with asset control, platforms with peer-provided assets, and platforms with peer-provided assets that possess business characteristics of a conveyor. Regarding

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<sup>11</sup> NBIC: nano, bio, info, and cognition technologies.

the topic of this work, it is interesting to study the ability of digital platforms that form the framework for the digitalisation of educational organisations to accumulate intangible assets of its participants and allow to use them according to the terms of interaction on a certain digital platform. As part of the digital educational environment system. A. E. Suleymankadieva et al. (2021) named technological platforms, digital technologies, stakeholders, and unlimited consumer segments.

According to the authors, the interaction between the participants on a digital educational platform is based on a concept of joint consumption that combines multiple opportunities for the quick, easy, and flexible exchange, rent, sale, and distribution of tangible and intangible assets (Trachuk, 2020; Schreiner & Kenning, 2018). In the operation of educational organisations, including the field of creative industries, the concept of joint consumption is the basis for the ideas of sharing the conveniences available to everyone (Shaimieva & Gumerova, 2023). Using the concept of joint consumption within existing and new digital educational platforms will allow implementing mentoring and teaching skills in various aspects of training future specialists<sup>12</sup>.

## Results

Analysis of previous works, indicating that the management of the innovation activity results of an educational organisation and the motivation of academic staff were the least studied topics in the Russian economic space, allowed the authors to visualise the process of clarifying the range of tools for improvement and development of the results of innovative and research activities of an educational organisation (IR tools) in the context of virtualisation of assets and virtualisation of organisation management (Fig. 1). The basic concept for

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<sup>12</sup> On the Year of the Teacher and Mentor in the Russian Federation : Decree of the President of the Russian Federation as of 27 June 2022 No. 401 // Official website of the Ministry of Education of the Russian Federation // <https://docs.edu.gov.ru/document/26ba12611bfc19a49fd3afee9d45e0a0/> (accessed on: 20.04.2023).

understanding these processes is “digitalisation of an educational organisation” that is used to describe a set of processes of virtualisation of assets, virtualisation of management, and platformisation of educational and managerial processes. Possession of IP increases the level of virtualisation of assets and management. Such digital environment areas of an educational organisation as “virtualisation of assets” and “virtualisation of management” have a range of tools that facilitate the improvement and promotion of this IP. This range of tools includes: new channels for delivering information to key or new segments, information consumers, and IP; new electronic library systems, digital resources, etc.

The operation and development of this range of tools is based on the concept of joint consumption. ELS based on the concept of joint consumption operates in the internal environment of an educational organisation and also interacts with external digital platforms (in particular, with digital platforms of federal publishing houses).

The ranking system of AS of educational organisations (RS AS) is usually located in its internal digital environment (Manushin, 2021).

It should be noted that “the data on RS AS confirm the results (for example, creation of IP)”, and points are accumulated. Thus, RS AS is primarily an active tool for the involvement of AS into the university’s innovation activities (Gumerova & Shaimieva, 2023. P. 206–207).

For the purposes of this study, we differentiated the concepts “research activities” and “innovation activities” of students and AS of an educational organisation.

Research activities of an educational organisation:

1. Do not include IP as their result. Research activities can be concluded with a presentation in the form of participation in an online competition.

2. Include IP as their result. IP may include:

a) publications indexed by international and Russian bibliographic databases;

b) IP in the form of databases, computer software, or patents registered by Rospatent<sup>13</sup>;

c) IP in the form of databases, computer software, or patents on the national public blockchain infrastructure in the area of intellectual property;

<sup>13</sup> Rospatent. Federal Service for Intellectual Property. URL: <https://rospatent.gov.ru>

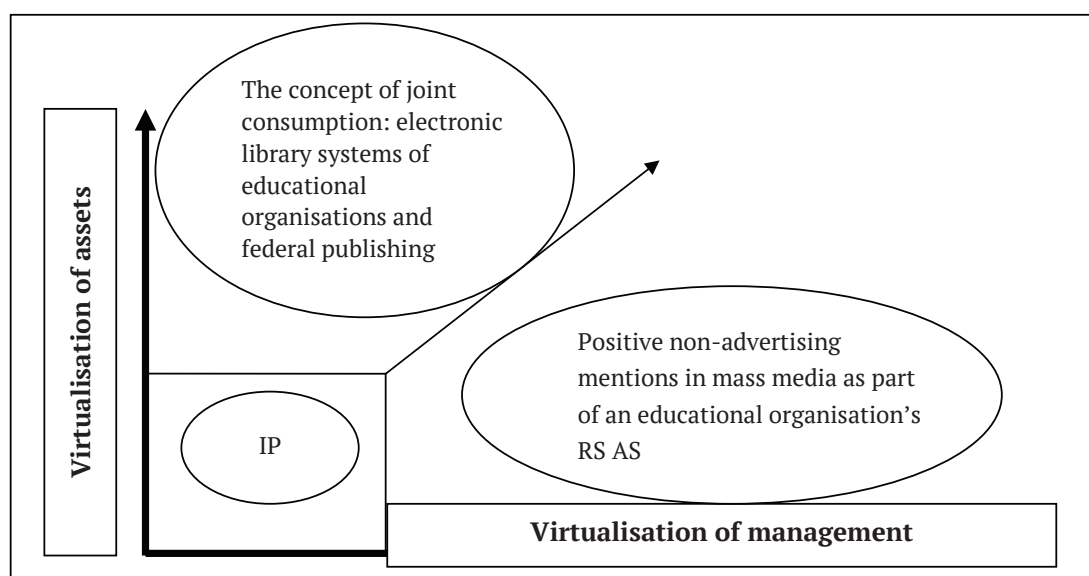


Fig. 1. The range of tools of intensification of innovation and research activities of an educational organisation in the course of its virtualisation (IP – intellectual property; RS AS – ranking system of academic staff; ELS – electronic library systems) [original survey based on (Gumerova et al., 2023)]

d) IP registered by other digital platforms for registration and protection of intellectual property (for instance, IREG)<sup>14</sup>;

3. Do not possess characteristics typical for innovation activities specified in regulatory documents<sup>15</sup>.

The legal regulation of the innovation activities of educational organisations is based on the Federal Law as of 29 December 2012 № 273-FZ “On Education in the Russian Federation,” emphasising the experimental and innovation activities of educational organisations. Innovation activities are aimed at improving scientific-pedagogical, educational-methodological, organisational, legal, financial-economic, staff, and equipment support of the education system and are conducted in the form of the implementation of innovative projects and programmes by organisations engaged in educational activities and those operating in the field of educational organisations, as well as their associations. In turn, experimental activities are aimed at the development, testing, and implementation of new educational technologies and educational resources and are conducted in the form of experiments regulated by the Government of the Russian Federation. In this study, “innovation activities” mean “all research... financial and commercial activities that was during the period of observation aimed at or led to creation of new or improved products (goods, services) that are significantly different from the products previously produced by the organisation and that are to be introduced on the market, as well as new or improved business processes that are significantly different from the previous corresponding business processes of the organisation that are to be introduced into the practical activities”<sup>16</sup>. It should be noted that the differentiation between “research” and “innovation” activities of an educational

organisation is of a theoretical nature and is used to identify the range of tools for their activation in the course of virtualisation of an educational organisation. However, this differentiation can be used in RS AS to develop and motivate research and innovation activities of AS of an educational organisation.

I. I. Bikeev (2007) and I. N. Ilyinykh (2011) noted that one of the most popular methods of involving academic staff in innovation activities in educational organisations is was RS AS.

In the Russian educational space, it has been operating since about 2011. The AS RS takes into account the indicators that characterise educational and methodological work, research, organisational and other types of activities of academic staff, including those based on IP. To assess the organisational work of AS, positive non-advertising mentions in mass media with the educational organisation named as the current place of employment can be analysed.

### **1. Student motivation**

To define this component in the section of “Positive mentions in mass media”, it is necessary to find a connection between “education” and “creative industries”. Education in the field of culture is an integral part of the creative industries (Akhmetshin & Vasiliev, 2022). Creative industries as the latest resource for economic growth in GDP have improved the characterisation of the digital economy as an economy of impressions, with impressions (emotions) being its new product. Positive mentions in the media help intensify students’ research activities, the main results of which can be presented in e-media as a product of “positive emotions and impressions” that will be received by everyone communicating with this student: significant IP indexed in databases; competitions (external, internal); online conferences (external, internal); other activities (Pogorletsky, 2022). Participation in online conferences requires extra efforts from students and AS in order to meet the Antiplagiat system requirements and present the results

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<sup>14</sup> Digital platform IREG. URL: <https://ireg.pro>

<sup>15</sup> In particular, the criterion of “significant difference from previous products available on the market” may be absent.

<sup>16</sup> Russian Statistical Yearbook. Moscow, 2022. P. 521–522.

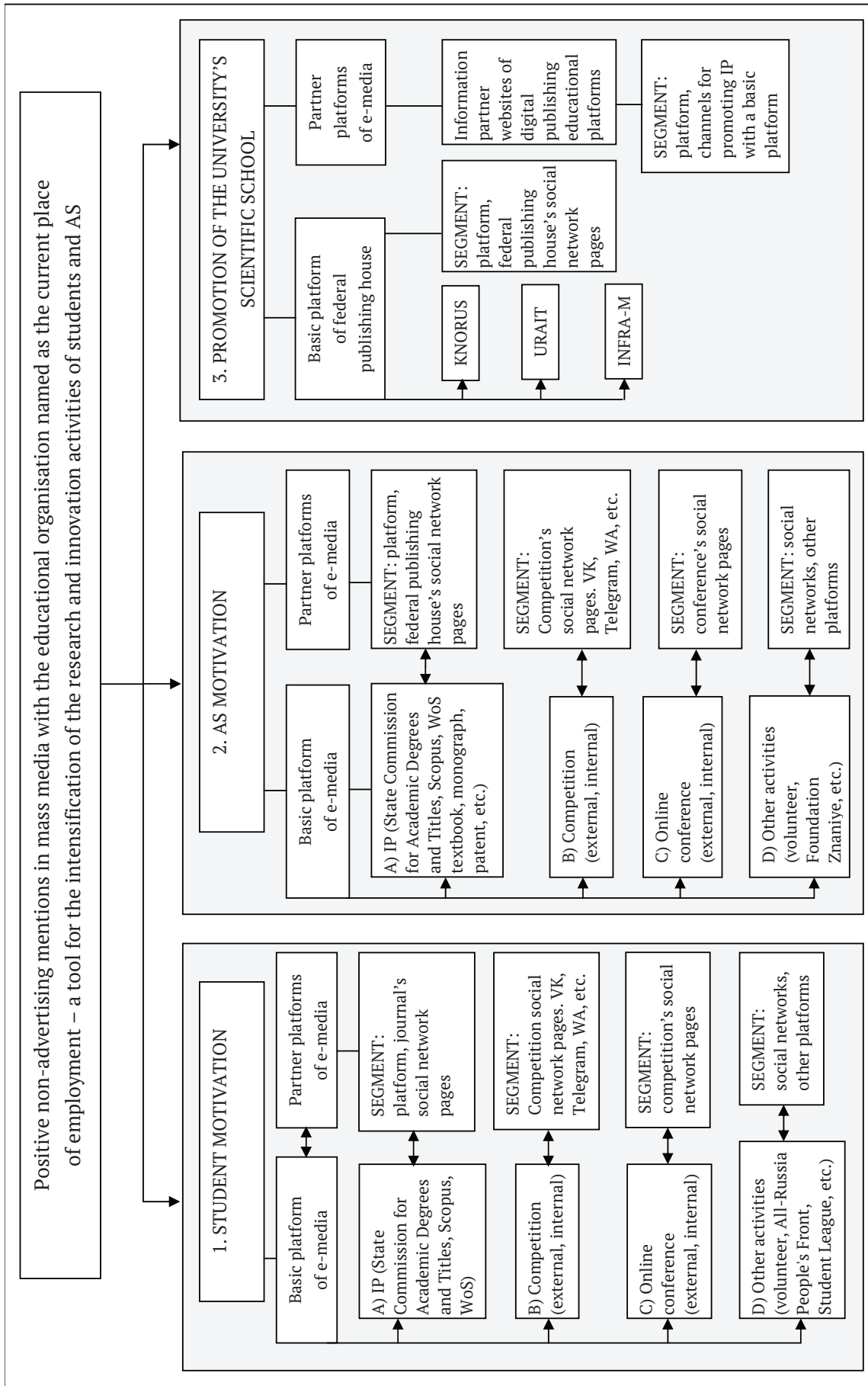


Fig. 2. Positive non-advertising mentions in mass media with the educational organisation named as the current place of employment as a tool for intensification of research and innovation activities of students and AS (IP – intellectual property; RS AS – ranking system of academic staff; VK – Russian social network VKontakte; WA – free messaging and IP voice communication service WhatsApp) [compiled by the authors]

of their work online. Each type of students' intellectual activity can be reflected on a basic e-media platform as well as partner platforms, since each e-media has its own segment of the virtual space market. Digital footprints left by the university's students in the virtual space are formed as a set of references in various segments of the virtual space. Students' research activities are usually impossible without the guidance of a research supervisor (a, b, fig. 2, Student motivation) (Timiryasova, 2020).

## **2. Academic staff motivation**

The research and innovation activities of the academic staff contribute to their true development and help involve students and collaborate with other universities. Such activities are reflected in e-media with the university being mentioned as a place of employment (Fig. 2). Not every IP presented in RS AS in the form of a "scientific publication in the Russian Science Citation Index" has a "digital footprint" or a positive non-advertising mention in mass media. Some journals indexed by the State Commission for Academic Degrees and Titles manage the process of promoting publications in social networks and virtual space, offering authors to present the content of their scientific paper in a simpler and more concise form of a social media post (Kobylko, 2022).

## **3. Promoting the university's scientific school on digital platforms and digital resources**

IP of the university's academic staff published in federal digital (educational) publishing houses are presented on the publishing house's digital platform. The digital platform of the leading publishing house interacts with universities' ELS and social networks where the results of the competitions and exhibitions held by the publishing house are also mentioned<sup>17</sup>. Digital

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<sup>17</sup> For example, the following tabs are presented on the official website of KNORUS: Gold Fund award, Textbook of the Year competition, winning publications. Official website of KNORUS. URL: <https://www.knorus.ru/avtoram/zolotoy-fond/> (accessed on: 20.04.2023).

partner platforms of leading publishing houses, each of which has its own segment in the virtual space, promote the university's scientific school to each consumer based on known promotion technologies. Digital partner platforms are rarely associated with universities' ELS; instead they have their own promotion channels. Readers can create a link to the Russian Science Citation Index or Google Scholar, which will be reflected in the corresponding profiles of the authors of the publications and the websites of scientific schools of educational organisations. University stakeholders receive information about the university and the educational process from various segments of the virtual space. Positive non-advertising mentions in mass media with the educational organisation form positive information about a university (of non-advertising nature) as a corporation that creates and manages knowledge. In this relation, O. I. Ponomareva (2019) rightly noted that the use of the abilities of digital platforms and ELS and the interaction between educational organisations and creative industries required its own theoretical justification for the intensification of innovation and research activities of educational organisations and participants of this process.

## **Discussion**

The presented work develops the scientific ideas of L. D. Gitelman et al. (2020) regarding the formation of a digital educational ecosystem as one of the anticipated goals of digitalisation of educational organisations and also updates the results of the original research (Gumerova, 2023) by developing a range of tools for the intensification of the research and innovation activities of educational organisations.

It should be noted that educational organisations that did not implement virtualisation processes at the time of the study were not taken into account in this research. Presumably, there were none of that kind. The considered educational organisations were not divided into higher, secondary, and specialised



education institutions as this aspect was not significant for this study. When studying the methods for the intensification of the research and innovation activities regarding the academic staff of educational organisations, there was no differentiation between research staff and teaching staff.

The concept of joint consumption, being one of the tools for the intensification of research and innovations as a result of this study, is based on the model of open innovations. Shin (2023) indicated that this model had been widely used to improve the innovation activities of organisations over the past decades. Alqahtani et al. (2023) noted that publicly available online open innovation platforms allowed communities to participate in open innovation processes by exchanging innovative ideas on specific problems. Malodia et al. (2023) considered the platformisation of innovation as a predecessor of open innovation. The authors also discovered a positive relationship between open innovations and the effective performance of an organisation.

The diagram “Positive non-advertising mentions in mass media with the educational organisation named as the current place of employment” formed by the authors is based on and develops the statement in the work of N. S. Churkina et al. (2020) on the network effect of economic growth during the technological revolution. This issue was further developed in the study of R. G. Pozhidaev (2022) regarding the direct and indirect effects of digital platforms.

### Conclusions

The conducted study of the areas for the intensification of the research and innovations of educational organisations in the course of digitalisation allowed the authors to obtain the following results.

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The item “Positive non-advertising mentions in mass media with the educational organisation named as the current place of employment” was identified as part of the ranking system of educational organisations as a tool for the intensification of the research and innovation activities of students, academic staff, and employees affiliated with this educational organisation.

It was shown that the virtualisation of an educational organisation based on the possession of intellectual property formed the latest range of tools for the development of the research and innovation activities of an educational organisation in the fields of “virtualisation of assets” and “virtualisation of management”.

A plan was suggested for the intensification of research and innovations, including all participants: students, academic staff, and scientific school of an educational organisation based on positive non-advertising mentions in mass media where the educational organisation was named as the current place of employment.

The “range of tools” for the development of research and innovations in an educational organisation in the course of its virtualisation implies the channels for the delivery of information on intellectual property of an educational organisation, electronic library systems, digital resources of an educational organisation, and ranking system of the academic staff of an educational organisation.

The obtained results of the study can be used for the intensification of research and innovations of educational institutions in the course of their virtualisation.

### Conflict of Interest

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

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## Менеджмент

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# Новейшие инструменты активизации исследовательской и инновационной деятельности образовательной организации в ее цифровой среде

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**Предмет.** Цифровизация деятельности образовательных организаций невозможна без активизации всех субъектов научного и образовательного процессов. В современных условиях эффективность цифровизации образовательной организации в значительной степени зависит от эффективности управления инновационной деятельностью.

**Цель.** В настоящем исследовании уточнен инструментарий для приумножения, развития результатов исследовательской и инновационной деятельности образовательной организации в процессе ее виртуализации с учетом всех участников данного процесса.

**Методология.** В работе проведен критический анализ трудов исследователей, индексированных в Научной электронной библиотеке, по предметным областям исследования: «исследовательская деятельность образовательных организаций, цифровая экономика», «инновационная деятельность образовательных организаций, цифровая экономика».

**Результаты.** Сформирована схема активизации исследовательской и инновационной деятельности, включающей ее участников (обучающихся, научно-педагогический персонал образовательной организации) на основе позитивных нерекламных упоминаний в средствах массовой информации (СМИ) с указанием образовательной организации как актуального места работы.

**Выводы.** Уточнение инструментария для развития результатов инновационной и исследовательской деятельности образовательной организации в процессе ее виртуализации позволило авторам дифференцировать понятия исследовательской и инновационной деятельности образовательной организации; выделить пункт «Позитивные нерекламные упоминания в средствах массовой информации с указанием образовательной организации как актуального места работы» в составе рейтинго-балльной системы данной образовательной организации как инструмента активизации исследовательской, инновационной деятельности обучающихся, профессорско-преподавательского состава в цифровой экономике; показать, что активизация исследовательской и инновационной деятельности образовательных организаций в цифровой экономике опирается на объекты интеллектуальной собственности.

**Ключевые слова:** цифровая экономика, университеты, объекты интеллектуальной собственности, научно-исследовательская активность, цифровизация.

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### **Конфликт интересов**

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