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MOODLE PLATFORM AS A KNOWLEDGE MANAGEMENT SYSTEM: RESULTS OF A QUESTIONNAIRE RESEARCH

Summary: Knowledge management is said to be one of the most significant tasks of any organization nowadays. The paper sets two research objectives to be performed: consideration of teachers as a kind of knowledge workers and analysis of knowledge management systems which support knowledge workers activity. For realization of the first objective literature analysis is performed and conclusions are drawn about the specific features of teachers as knowledge distributors. Realization of the second objective is presented by the results of a questionnaire, distributed among teachers of Polish universities, and directed at finding out whether an open-source platform Moodle, as a knowledge management system, meets the requirements of knowledge workers.

Keywords: knowledge management, knowledge management system, knowledge worker, communication tool, Moodle platform.

Introduction

The modern developing economical structure is characterized by the increasing value of the notion of *knowledge management* (KM), which, replacing the more traditional factors, is addressed as one of the most significant concerns of almost any large organization. The use of up-to-date knowledge is of high strategic importance and is required for innovations development as well as for providing internal changes in organizations.

Speaking about managing knowledge, it is reasonable to consider the two elements, without which KM performance will be meaningless: the *tools* which

assist the process of KM and the *people*, who apply knowledge with the help of these tools.

Implementation of various IT systems for supporting knowledge management processes has recently gained significant popularity. Nevertheless, majority of these tools can be applied only for specific activities, typical and routine, which form only a small part of larger knowledge-intensive processes. Only a few of them, also known as *knowledge management systems* (KMS), integrate functionalities and provide comprehensive organization and control of the processes knowledge generation, transfer and storage [1].

Knowledge workers, alternatively called knowledge entrepreneurs, or simply the human capital, form the fastest growing sector of workforce in the world. These are people who acquire, manipulate, interpret, and apply information in order to perform multidisciplinary, complex and unpredictable work. They analyze information and apply expertise in a variety of areas to solve problems, generate ideas, or create new products and services [2]. It is said that the intelligence of knowledge workers has become the fuel of organizational growth [3].

The study of works in industry and academics allows to come to a conclusion that most of the research, connected with knowledge workers, consider them as employees of business institutions, who apply their knowledge for the benefit of innovativeness and competitiveness of their organizations.

That is why the author sees the necessity to justify the fact that knowledge workers belong not only to institutions, connected with business. Thus *the first objective* of the paper is to consider employees of the educational sphere as knowledge workers, who apply information not for production goals, but in order to generate new arrays of information, i.e. new knowledge.

The second objective of the paper is to analyze the specificity of knowledge management systems for knowledge workers at educational institutions and to examine the possibilities that such KMS provide.

1. Knowledge workers in education

In order to connect employees of the educational sphere with the knowledge workers, it is required to determine this notion first. Literature brings many definitions of this phenomenon, and the author has selected the most valuable of them – from the author's point of view (Table 1).

Table 1. Definitions of the notion *knowledge worker*

Author	Definition
Drucker, 1995 [4]	<i>Knowledge workers</i> are high level employees who apply theoretical and analytical knowledge, acquired through formal education, to develop new products or services
Reinhardt et al., 2011 [5]	<i>Knowledge worker</i> performs a set of knowledge-intensive tasks (decision-making, knowledge-production scenarios, monitoring organizational performance, etc.), mainly with the support of IT, dominated by communication, data production and consumption actions
Pyöriä, 2005 [6]	<i>Knowledge workers</i> are those who create immaterial outputs, process and manipulate information. It is the information content that defines the task that is performed by the worker, his strategy and the result of his work; and the process itself is the main substance of work for knowledge workers
Figuerska, 2015 [7]	The possession of higher education, which means an above-average level of knowledge in a particular area, is the basic factor which distinguishes <i>knowledge workers</i> from other employees
Davenport, 2005, 2007 [8], [9]	<i>Knowledge workers</i> are people, who have high degrees of expertise, education or experience, and the primary purpose of their jobs involves the creation distribution, or application of knowledge. <i>Knowledge workers</i> create the greatest added value and affect the value of their organizations
Morawski, 2003 [10]	<i>Knowledge workers</i> have unique skills as well as are: specialized in their profession, well-informed, active and responsible, aware of their role and their self-worth, independent participants of the organization
Gurteen, 2006 [11]	<i>Knowledge workers</i> continually strive to understand the world about them and modify their work practices and behaviors to better meet their personal and organizational objectives
Serrat, 2008 [12]	<i>Knowledge workers</i> are employed because of their knowledge of a subject matter, rather than ability to perform manual labor; understand, identify with, and see how their own contribution can be enhanced. They put their best abilities to the test. They challenge and achieve
Skrzypek, 2009 [13]	<i>Knowledge workers</i> paid for efficiency of thinking, and their minds are regarded as the primary work tools
Morello and Caldwell, 2001 [14]	<i>Knowledge workers</i> understand, define, influence and help shape their domain of influence, knowledge, activity and responsibility. They understand the people, information and potential resources within that domain as well as have the authority to act within that domain
Mikuła, 2006 [15]	<i>Knowledge worker</i> presents appropriate attitudes such as: involvement in work, depending to a large extent on their inner hierarchy of needs; trust which signifies an inner belief the other part is trustworthy in mutual relations; creative direction, constituting the basis for the creation of new knowledge; flexibility; the improvement of production quality; proactive attitude of an organization towards environment, providing services and mutual respect among people; mutual respect between people which conditions the obtainment of the above-mentioned attitudes

Source: Analysis of research works on the topic of the paper.

In order to conclude the opinions, given above, the author has formulated the *generalized definition of a knowledge worker*:

It is a high-level employee, possessing higher education as well as high degree of expertise and experience. A knowledge worker performs knowledge-intensive tasks like decision-making; he/she applies theoretical and analytical knowledge in order to perform the primary objective of his/her work – to create and distribute new knowledge. A knowledge worker is specialized in his/her profession, well-informed, active and responsible, aware of his/her role and

his/her own self-worth. The mind of a knowledge worker is regarded as his/her primary work tool.

In the work of Porat [16] five groups of knowledge workers are distinguished: knowledge producers, knowledge distributors, market search and coordination specialists, information processors, information machine workers. The workers of educational sphere are referred to as *knowledge distributors*.

In accordance with the above-mentioned classification the author would like to reveal the major specific features of teachers as knowledge distributors, i.e. to perform *the first objective of the research* – to consider educational employees as knowledge workers. Thus, *a teacher* is a person *who*:

1. *Has* – theoretical and practical knowledge as well as professional experience not only in their professional area, but in all the spheres connected with it (for instance, in pedagogy, psychology, philosophy, management, etc.); social competences; high professional and human values.
2. *Wants* – to develop and improve knowledge (personal as well as publicly available), share and apply this knowledge, experience, competences, as well as apply resources, methods and tools (those known before and personal methods of teaching, communicating, influencing people, etc.).
3. *Is able* – to search, find, interpret and apply personal and publicly available knowledge, experiences, tools, resources, methods etc. due to the personal natural and gained skills.
4. *Can* – using the opportunities, provided by the University, actively participate in the process of creating new knowledge during the process of learning as well on students' graduation from the University.
5. *Requires* – knowledge, experience, social competencies, engagement, etc. to achieve the objectives of the University.

Besides, according to the theory of Bernstein [17], modern teachers, as representatives of the knowledge work, in the process of knowledge distribution realize the interaction between:

- 1) *Technology*, which is driving the productivity of knowledge work – the technology of obtaining, storing, extracting and distributing knowledge among other teachers as well as among students.
- 2) *Information*, which is the basis for knowledge and decision making – information as a result of processing data and facts, available in various information sources, as well as of the results of personal conclusions, experience and wisdom.
- 3) *Humans*, who are performing the process of education and management at the University (for students and employees).

The core knowledge activities of teachers involve: applying, presenting, sharing, analyzing, organizing, evaluating, obtaining, storing and securing information with an objective to create and distribute new knowledge. It is necessary to stress that the “carriers” of new knowledge have two forms. The first one is standard and includes documents, textbooks, program products, innovations, etc. The second form of “carriers”, which is atypical for other organizations, includes graduates of educational institutions, whose knowledge, transformed with the consideration of their own vision and understanding of specific problems as well as of their practical experience of using the obtained knowledge, form a qualitatively new level of results of knowledge worker performance.

Moreover, it is required to highlight that one of the important components of knowledge worker’s activity is the requirement of a powerful technical support. In case of teachers such technical tools are:

1. Information systems of knowledge search, storage and distribution.
2. Automated means of new knowledge creation (various experiments, tests, research, etc.).

In connection to this the author consists the realization of the second objective of the paper – *the analysis of knowledge management systems* to be very urgent.

2. Knowledge Management Systems at Educational Institutions

To realize *the second objective of the research* – the analysis of specificity of KM systems for workers at educational institutions, the author has chosen the open-source learning platform Moodle (further – “Platform”).

Moodle is a free and open-source software learning management system. Developed on pedagogical principles, the Platform is used for blended learning, distance education and other e-learning projects in schools, universities, workplaces and other sectors. The Platform is used to create private websites with online courses for educators and trainers. Moodle is an acronym for Modular Object-Oriented Dynamic Learning Environment [18].

The author considers Moodle to be a good example of an information systems of knowledge search, storage and distribution – a tool for knowledge distribution assistance. Technical features of this Platform allow to obtain, share, store and apply information, as well as having it rather secure in the Platform’s storage system.

The questionnaire was developed to find out whether Moodle meets all the requirements of knowledge workers, being one of the most widely used knowledge management systems.

The research was focused on *teachers of higher educational institutions*. The questionnaire was distributed in 2 large Polish institutions, one located in Silesian voivodeship and the other – in the Pomeranian.

The *respondents* of the research were the teachers who possess the degree of Master of Science (30,2%), Doctor of Philosophy (60,5%) and the Habilitation degree (9,3%). The interviewed were divided into two groups: those, who use the Platform within their courses (51,2%), and those, who do not (48,8%). The users of the Platform were then asked to answer questions about its performance, and those respondents, who prefer not to use the Platform, were asked to justify their opinion and share information about other systems they prefer to use.

2.1. Respondents using the Platform

It was found out that 59,1% of the respondents use the Platform during the whole study process, while 4,5% say that they have been using the Platform much less recently.

Table 2 presents answers to the question “Which factors influence Your decision to use the Platform?”.

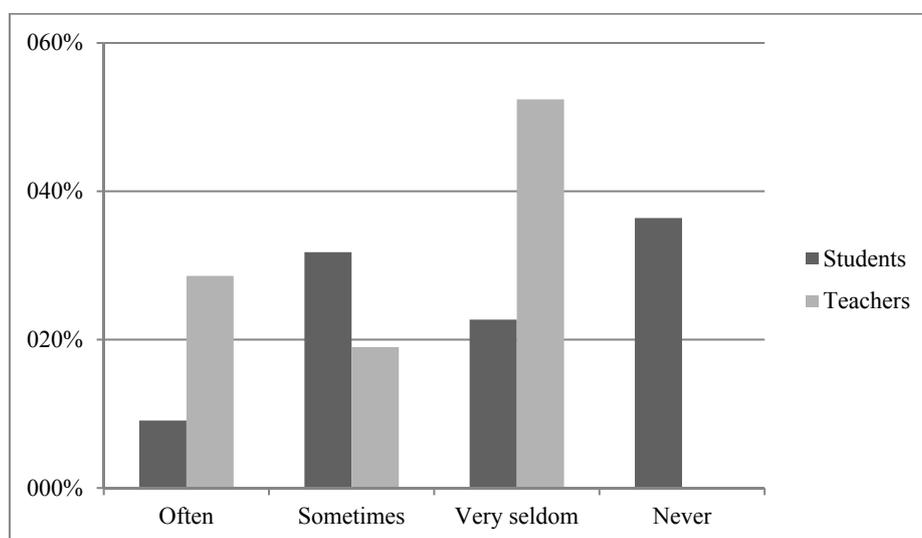
Table 2. Factors that influence usage of the Platform by the teachers

Factors	Answers*
The necessity to use the Platform at a particular moment of time	52,4%
Type of materials used within the course	38,1%
Access to the Platform available for all students of the course	23,8%
Amount of materials used within the course	19%
Students will to use the Platform	19%

* A few answers were possible.

Source: Results of the questionnaire [19].

The respondents were also asked to share the information about *students' attitude* towards the Platform, as well as their own *opinions*. Figure 1 and Table 3 reflect the results obtained concerning this issue.

Figure 1. Students and teachers facing problems when using the Platform

Source: Results of the questionnaire [19].

Table 3. Problems, faced by students and teachers using the Platform (according to the teachers)

Problems	Students*	Teachers*
Errors occur when downloading/attaching materials	6,7%	8,3%
Errors occur when logging in	60%	16,7%
The catalogue of files has a complicated structure	6,7%	25%
The interface is not user-friendly	20%	41,7%
The process of logging in is very slow	6,7%	33,3%
The speed of materials downloading/attaching is very low	13,3%	16,7%
The speed of pages loading is very low	13,3%	41,7%
The absence (or the low level) of feedback	–	8,3%
Other	40%	–

* A few answers were possible.

Source: Results of the questionnaire [19].

It is also reasonable to consider the remarks, given in the answer “Other”, where the respondents could express their opinions.

It is stated that students do not pay proper attention to the instructions for the logging-in process and thus face many problems they could possibly avoid. It is yet suggested that such problems may be caused by the insufficient explanation of the logging-in procedure.

It is also mentioned that students often forget to check the update of materials and miss some important information. The author sees this problem as the

justification of the importance of “intellectual” changes at the Platform, which were suggested further.

The questionnaire contained the section, which offered the respondents to choose *the options of changes* that, in their opinion, should be introduced to the Platform to optimize its work and attract more users. These options were divided into 2 categories: 1) *general changes*, which include improvements of the current Platform functions; 2) changes, aimed at facilitating *the work of intellectual workers* (particularly, teachers at higher educational institutions).

Table 4 contains answers to the question “What kind of changes would You like to add to the Platform?”.

Table 4. The options of changes at the Platform

Changes	Answers*
<i>General changes</i>	
Add the option of materials group downloading/attaching	72,7%
Changes in the interface to make it more attractive	31,8%
Change the structure of the catalogue of files	31,8%
Increase the speed of pages loading, eliminate errors	27,3%
Increase the level of materials protection	13,6%
No changes at the Platform required	4,5%
I do not know	4,5%
Other	22,7%
<i>“Intellectual” changes</i>	
Possibility to edit materials directly at the Platform	66,7%
Mobile application Moodle	61,9%
Key words search of materials	52,4%
Possibility to view statistics of the materials watched/downloaded	42,9%
Calendar settings – reminders for the user to add new materials	33,3%
Automatic notification of users when new materials are added	28,6%
Function of the live-chat with students and other user of the Platform	23,8%
Prompts for each element of the menu (for new users)	14,3%

* A few answers were possible.

Source: Results of the questionnaire [19].

The option “Other” in the section “General changes” includes two suggestions, which were not considered by the author, but are of great importance and, if introduced, can attract significantly more users to the Platform. They are as follows:

1. An e-mail box, which would allow to communicate with students and other teachers directly at the platform, without using another services.
2. The logging-in system should not be based on the creation of a specific user account. It is much easier to use the logging-in data of another profile, which is already registered in the University’s system.

Concerning the question of *efficiency*, 31,8% of respondents believe that the Platform simplifies and fastens students' work during the course. At the same time, 45,5% of the respondents stated that there is no need to replace the Platform with any other platform, which would have similar functions but better characteristics.

2.2. Respondents using another communication tools

Moving further there is a necessity to pay attention to those respondents, who prefer not use the Platform in their educational activity. Table 5 contains information about *the reasons of the Platform non-usage*, while Table 6 presents *the list of preferences* of this block of respondents. It is reasonable to add that 100% of respondents are content with the communication tools they have selected. To prove that statement, Table 7 contains information about the main *advantages* of the selected communication tools (opinions of the users).

Table 5. "Why do not You use the Platform within Your education process?"

Reasons	Answers*
There is no necessity to use the Platform	52,6%
I do not like the way the Platform operates	21,1%
I have too many problems while using the Platform	5,3%
I do not exchange materials with the students	5,3%
Other: <ul style="list-style-type: none"> • The subject I provide does not require to use the Platform • I simply prefer another channel of communication • I have no time to learn how it operates • Students prefer another channel of communication 	31,6%

* A few answers were possible.

Source: Results of the questionnaire [19].

Table 6. Preferred channels of communication

Communication tools	Answers*
E-mail on the University's server	90,5%
Cloud storage (Google Drive, DropBox, etc.)	32,8%
Private e-mail	14,3%
E-mail, created specifically for communication with students	9,5%
Other: personal web-page; web-page of the Department	9,5%

* A few answers were possible.

Source: Results of the questionnaire [19].

Table 7. Advantages of the communication tools, preferred by the respondents

Advantages	Answers*
Information reaches all the students quickly	52,4%
User-friendly interface	42,9%
Materials group downloading/attaching option	28,6%
Large data storage place	23,8%
High speed of materials downloading/attaching	19%
Feedback is obtained quickly	19%
I do not know	19%
High level of materials protection	4,8%
Other: the tool can be used on any mobile device	4,8%

* A few answers were possible.

Source: Results of the questionnaire [19].

In the end of the questionnaire the respondents were asked a few general questions, which allowed the author to obtain the following information:

- 1) 61,9% of the respondents think that application of the Moodle Platform or any other similar platform *should not be obligatory* at universities, while 28,6% have the opposite opinion;
- 2) 71,4% strongly agree with the fact that it is necessary *to analyze the opinions of teachers* before introducing such platform at the University; 23,8% disagree with this statement;
- 3) 61,9% state that it is necessary *to analyze the opinions of students* before introducing such platform at the University; 30,9% think that students' opinions should not be taken into consideration.

2.3. Results of the questionnaire research

Having studied all sections of the questionnaire and analyzed answers of all the respondents, who kindly agreed to take part in the research, the author came up with the following conclusions about Moodle open-source learning platform and its application at Polish universities:

1. Being an obligatory tool to be used at the Universities, Moodle is used only by a half of the respondents. The teachers who do not use the Platform, apply other tools, which allow them to maintain a high level of communication with the students and with each other. In most cases, the e-mail at the University's server is the best option. Yet preferences are also given to *cloud data storages*, *private e-mails* and even to the specifically created *web-pages*. The respondents say they choose such communication tools because they enable a faster transfer of information to all the users and have a very user-friendly interface.

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2. The Platform is mostly used by teachers for all the courses they provide. But some of them turn to Moodle only in case it is needed at the particular moment and there is no better option to use. At the same time nearly a half of the teaches from time to time face problems when using Moodle. According to the information they possess, their students also complain on some difficulties in working with the Platform. As for the students, they mostly have problems with *errors in the logging-in process* and with the speed of Moodle's operation. Some of them also express discontent with *the interface of the Platform*. Teachers, on the other hand, mainly face the same difficulties as their students do. Yet it is necessary to add that *the catalogue of files* has a rather complicated structure and it takes quite a long time to attach all the necessary materials and structure them by folders and topics.
 3. If speaking about the *changes*, that could simplify the application of Moodle and attract more users to it, the author would like to specify the following (based on the author's suggestions as well as on the recommendations of the respondents):
 - Possibility of materials *group downloading/attachment*. It may significantly save time needed for working with the Platform.
 - *E-mail box* directly at the Platform – to simplify the access to all the contact and speed up the communication process.
 - Possibility to use *the existing university profile* for logging-in at Moodle. This eliminates the necessity to remember additional logins and passwords and makes the access to the Platform easier.
 - The function of *editing materials right at Moodle* with no need to re-attach them. It may significantly save time needed for working with the Platform.
 - *Mobile Moodle application*. Since almost everyone is now using mobile devices (smart-phones and tablets) for reading/writing e-mails, reading news, etc., and Internet connection is easily available on such devices, this application could allow teachers and students to download/attach materials “on-the-go”, receive urgent information immediately and generally stay in touch all the time.
 - The possibility to search materials by *key-words*. The more material we is added at the Platform, the more time users need to find something (especially if it was added long ago). Replacing the necessity to look through all the folders by the possibility to enter one or two key-words in the search bar may be a valuable “user-friendly” option.

- *Notification functions* for users. Sometimes it is very difficult to keep in mind all the things that should be done within a day/week/month. It is suggested to add a special calendar at Moodle, which could send reminders to teachers when there is a need to add some new materials (in accordance with the schedule set by teachers for their courses). This calendar may also send notifications to students whenever new materials are added to the courses they have.

In the end it is necessary to say that Moodle platform is widely used among teachers of Polish universities, even though many of them face difficulties with its operation. At the same time, more than a half of the respondents are sure that Moodle should not be an obligatory tool to use and there should always be other options of communication tools to choose. The respondents also state that introduction of Moodle or any other similar platform should be performed only after the analysis of opinions of teachers and students, who will directly work with this platform in future.

Conclusions

The research paper raises an important question of knowledge management, which is a key strategic component of innovative development of organizations at any branch of modern economy. The process of knowledge management conduction includes two major elements: the tools – systems of support for any activities within the process; and people, who create, store, distribute and manage knowledge with the help of such support systems.

The author sets two major objectives of the paper:

- 1) To consider educational employees as a type of knowledge workers, who apply existing knowledge to create another new layers of knowledge.
- 2) To analyze the specific features, advantages and disadvantages of knowledge management systems applied by knowledge workers at educational institutions.

To implement the first objective the author has formulated the generalized definition of knowledge workers, stating that they: possess higher education, high degree of expertise and experience; perform knowledge-intensive tasks, applying theoretical and analytical knowledge; are well-informed, active and responsible. The mind of a knowledge workers is stated to be his/her primary work tools.

In accordance with the existing classification of knowledge workers, the author refers teachers as a group of knowledge distributors: people, who have theo-

retical and practical knowledge in their professional area and in the connected spheres; are eager to develop, improve, share and apply knowledge; can actively participate in the knowledge creation process using all the resources, whether they are gained personally or provided by their institutions. It is also concluded that in the process of knowledge distribution teachers realize the interaction between technology, information and other people, applying various support systems for knowledge creation, storage, distribution and search. This conclusion has led the author to conduction of the second objective of the paper.

Implementation of the second objective has been carried out with the help of a questionnaire, distributed among teacher of a number of higher educational institutions in Poland. The aim of the questionnaire was to find out whether the open-source learning platform Moodle, which is one of the most widely used knowledge management system, meets all the requirements of teachers as knowledge workers. The questionnaire has shown the following results:

1. Moodle is used by 51,2% of teachers within all the courses they conduct; 48,8% do not use the Platform.
2. Some teachers prefer cloud data storages, private e-mails and specifically created web-pages to the application of Moodle. The respondents state that such communication tools are chosen because they enable a faster transfer of information to all the users and have a more user-friendly interface.
3. Some teachers, as well as students, face problems with errors in the logging-in process and with the speed of Moodle's operation. It is also added that the catalogue of files has a rather complicated structure and it takes quite a long time for teachers to attach all the necessary materials and structure them by folders and topics.
4. The questionnaire also has helped to reveal recommendations about a few changes, which could simplify the application of Moodle and attract more users to it. The list of changes includes: possibility to add a group of material at one time; an e-mail box for a direct communication at the Platform; the functions of material direct editing without necessity to re-attach them to the Platform; mobile application for the possibility to work with Moodle on-the-go; possibility of key-words search of materials; calendar with notifications for students and teachers.

Finally, the author has come to the conclusion that Moodle platform is widely used among teachers of Polish universities, despite the fact that many difficulties with its operation are faced. The author considers that implementation of changes, suggested after the analysis of opinions of teachers and students, will increase the number of users of Moodle and will reduce the necessity of searching for alternative support systems.

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PLATFORMA MOODLE JAKO SYSTEM ZARZĄDZANIA WIEDZĄ: WYNIKI BADANIA ANKIETOWEGO

Streszczenie: Zarządzanie wiedzą jest uważane za jedno z najważniejszych zadań każdej organizacji w dzisiejszych czasach. Niniejszy artykuł przedstawia dwa cele badawcze: analizę nauczyciela jako pracownika wiedzy oraz analizę systemów zarządzania wiedzą, które wspierają działalność pracowników wiedzy. Do realizacji pierwszego z nich została wykonana analiza literatury oraz zostały sformułowane wnioski na temat specyficznych cech nauczycieli jako dystrybutorów wiedzy. Realizacja drugiego jest prezentowana w wynikach ankiety skierowanej do nauczycieli polskich uczelni, której zamierzeniem było uzyskanie odpowiedzi na pytanie: czy platforma Moodle, jako system zarządzania wiedzą, spełnia wymagania pracowników wiedzy?

Słowa kluczowe: zarządzanie wiedzą, system zarządzania wiedzą, pracownik wiedzy, narzędzie komunikacyjne, platforma Moodle.