



# PROJECT MANAGEMENT SOFTWARE IN THE FIELD OF PROFESSIONAL (VOCATIONAL) EDUCATION

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## **Abstract.**

*Relevance.* The digitalization of society and education has changed approaches to management behaviour, which is noticeable in terms of project management in professional (vocational) education schools. It has led to the allocation of resources to ensure the effective functioning of professional (vocational) education schools and enhance their competitiveness by improving their internal processes and expanding the range of educational services provided to students and the adult population.

*Aim:* the study aims to clarify the characteristics of project management in the field of professional (vocational) education through the use of specialized software.

*Methods.* Analysis of project management software. This method made it possible to differentiate the software into structural elements. It allowed establishing interconnections between the elements of the software as a system. Certain features of an internal logical construction of the software interface for project management were described by using external and internal interpretations (the descriptive method) and the method of analysis. Such methods as comparison and collation play an essential place in the study. By comparison, the differences between the software products were determined. By collation, the similarities between the software for project management were clarified and, as a result, its specificity.

*Results:* the list and key features of project management software in the field of professional (vocational) education were outlined.

*Conclusions:* project planning in professional (vocational) education schools is used for displaying the schedule of project objectives graphically and visualizing the interaction between its internal objectives; document sharing and teamwork implemented through a central document repository; exchange of calendars and contacts: project schedules, dates of activities and contacts, which should be automatically updated in all calendars of the persons conducting project activities; control over failures and unforeseen consequences.

**Keywords:** *software, project management, professional education, the critical path method, Gantt chart, Trello, Bitrix24, Microsoft project.*

**Introduction.** The rapid development of technological progress and the digitization of society and education have changed approaches to management behaviour, which is particularly evident in project management in the field of professional (vocational) education at all levels, including administrative. Project activities enable the effective use of fiscal and human resources to achieve educational and management goals. It is reinforced by the increase in internal competition among professional (vocational)

education schools (hereinafter “P(V)E schools”), which results in the provision of quality educational services in a short time. In this regard, project activities in the field of education should be aimed at ensuring the effective functioning of P(V)E schools, enhancing their ability to outperform their competitors based on continuous improvement of their internal processes and expanding the range of educational services they provide to students and adults. In this context, software-based project management is crit-

ical for P(V)E schools to reach quality indicators of education and production activities.

**The study aims** to clarify the characteristics of project management in the field of professional (vocational) education through the use of specialized software.

**Research methods:** The scientific search is mostly based on the **analysis** of project management software. This method made it possible to differentiate the software into structural elements. It allowed establishing interconnections between the elements of the software as a system. Certain features of an internal logical construction of the software interface for project management were described by using external and internal interpretations (**the descriptive method**) and the method of **analysis**. Such methods as **comparison** and **collation** play an essential place in the study. By comparison, the differences between the software products were determined. By collation, the similarities between project management software were clarified and, as a result, its specificity.

**Materials.** Such scholars as Yu. Burimenko, L. Galan, I. Lebedeva, A. Shchurovskaya (2017), O. Borodienko (2015, 2017), O. Radkevych (2011) studied theoretical and practical aspects of project work execution, functioning of administrative staff competency assessment systems, software personalization Besides, O. Marynovska (2016), M. Zagirnyak (2015), Yu. Guseva, M. Kantsevich, I. Chumachenko (2015) analyzed technological management of innovative projects in the field of education, in particular in terms of economic, resource and quality factors.

Such foreign researchers as A. Kinser, K. Jacobson (2017) paid particular attention to the issues of project management. However, current approaches to using project management software in P(V)E schools are still poorly researched. Given this, the authors of the

article consider it necessary to disclose the problem of choosing software for project management in the field of professional (vocational) education, both from theoretical and applied perspectives.

**Results and discussion.** The justification of modern approaches to project management in the field of professional (vocational) education causes the need to define the term “project activity”, which is a component of project management and implies consistent and purposeful work on setting project timelines, managing human resource, avoiding risks, enhancing the quality of the project’s product and reaching expected outcomes. Such activity aims to analyze, monitor, plan and control project activities. In this context, software tools will aim to manage projects more effectively and achieve better project results. Thus, unlike traditional methods, the use of software slightly simplifies project management through the use of electronic resources, which makes it possible to operate a vast array of resources and information.

The term “software” for project management covers a wide variety of software, which may include several different combinations and functions. Most programmes on project management include Gantt charts (*see Fig. 1*) to display the project schedule visually. It was named after Henry Gantt, who adapted and promoted the use of a graphic style in project activities (Kinser A., Jacobson K. 2017). The chart is actively used to evaluate the sequence of project objectives, their timelines and workload visually. It is also applied in modern project management software.

The critical path method is rather vital for project management in P(V)E schools (*see Fig. 2*). It is a step-by-step methodology with a multi-step project planning algorithm that involves complex interdependent actions. A critical path method is a crucial tool for managing any project since it identifies critical



Fig. 1. An example of a Gantt chart

and non-critical project objectives. It is often used to analyze the logic of a project network to maximize its effectiveness.

It seems only logical that the critical path method is a system of time and resource management needed to complete any project. An essential element of this system is that all tasks within the critical path are relevant and cannot be postponed or overlooked in the course of work on the project without damage to the latter. The differentiation of the time required for the project implementation depends on the available resources. Besides, one should divide the critical path method into elements. First, it is essential to outline priority tasks. Second, it is crucial to prepare a list of project tasks. Third, it is vital to create a flowchart (Gantt chart) that covers all the tasks. Fourth, it is required to identify relevant, critical and non-critical project tasks. Fifth, it is essential to allocate time to project tasks (lead time). Sixth, it is necessary to study all alternatives to the course of events with timelines and supplement the project flow chart with them. With this in mind, one should be able to quickly track the progress of the project, which involves concurrent (simultaneous) project activities and the involvement of additional resources (human, material, technical) to shorten the time for its implementation. However, this can increase resource expenditure and, in some cases, the project life cycle.

During the project implementation, it is equally essential to use specialized software. In this context, the overview of the functions of such software is up-to-date. First, it includes designing the structure of project tasks and their implementation plans, describing critical parameters of the project, establishing logical

links between the tasks, ensuring a multi-level project presentation and supporting the project calendar. Second, it implies financial and resources planning, which covers the project team, expenditure plans, available resources, inventory and daily expenditure and explains the allocation of resources and costs and support for resource and deadline schedule in case of limited resources. Third, it means monitoring the progress of the project, which includes fixing the planned parameters of the project in the database, inserting factual performance indicators, listing actual workload and resources, comparing expected and factual indicators, forecasting performance. Fourth, it involves the tools for a graphic display of the project structure and a generation of various project reports, namely, Gantt chart, network diagrams (PERT charts), reports on the project implementation, resource use and expenditures. Fifth, it is related to organizing group work (Zahirniak, 2015).

Project management can use both fixed and online platforms. The fixed platform is installed on the PC and synchronized with other computers used by the project team. The online platform has all the features of the fixed platform and is located on cloud services. It allows the project team to work from anywhere using a smartphone, tablet or laptop. Thus, it enables distance working, which is an essential argument for the leaders of P(V)E schools.

Online software can be used in project management. It refers to ordinary software with secondary functionality and basic functionality required in P(V)E schools. The features of such software include task management, team collaboration, tutorials, email integration and file management. The sophisticated software includes more project elements covering the

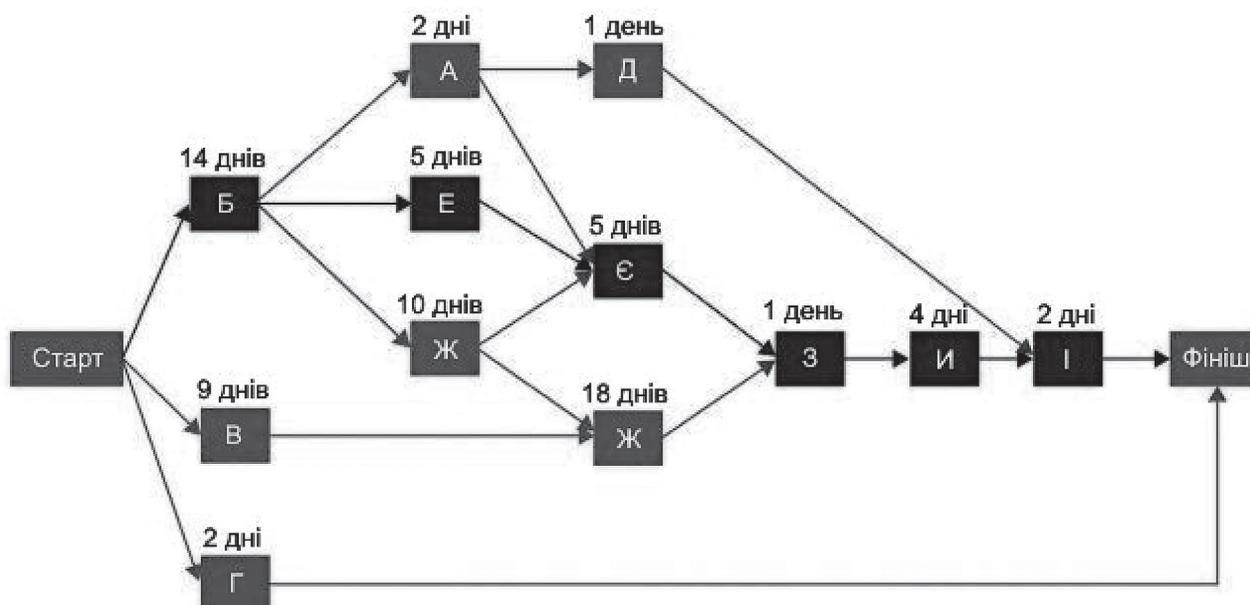


Fig. 2. Visualization of the critical path method

main functions of project management and additional ones, such as planning, resource management, financial management, task management. Depending on the type of software, one can control the results even better and monitor the project progress in real time.

One should be able to define the essential functions of project management to better understand it using the software. *Task management* is one of the important ones. Also, the software should provide users with the ability to install dependencies on the content of the task, create and manage sub-tasks for more significant tasks, set tasks for practice at a specified time and appoint more than one actor to the task. Not least important, there is the import of a to-do list from an external file, such as a spreadsheet and *team collaboration*, which allows any number of individuals to not only communicate but also have discussions about project activities, which is a must element of their success. Therefore, the software should provide a virtual space for comfortable discussion, document creation, and sharing and messaging between the project team. *Tutorials* also play a significant role in the software. Regardless of his or her level of computer skills, anyone can learn, get acquainted with scientific developments, watch video lessons, participate in webinars, plan their working hours. As a result of reduced instruction time, the software also allows users to spend more time doing their work. Email is of great value for project management since it enables communication with the project participants. Being able to receive and send emails dramatically improves the productivity of project activities by minimizing the programme changing time. Emails can be a source of status updates. Finally, new tasks or work progress reports can be emailed, too.

The features of *document management* include secure document storage, ability to attach documents to tasks, posting of notes and comments on uploaded documents, upload of multiple documents, organization of documents in folders and control over their versions. With this in mind, **mobility/remotability** in project management becomes relevant, especially in terms of performing project tasks. Given this, the

critical feature of such work is the software that supports the possibility of remote work among leaders in P(V)E schools. Many organizations with which P(V)E schools cooperate already use various project management systems, other than those established in the institutions. Therefore, the possibility to *integrate with third-party software* is significant for the development of cooperation.

The project management software in P(V)E schools enables clients to influence the workflow of both customers and performers, which is possible through settings. All project management decisions are usually similar to *reports*. However, there are different requirements for every particular case, which may sometimes imply more than just a general report. The software that can offer many types of reports will have some advantage over the much more straightforward options.

The software allows *scheduling*, such as setting task timings, creating timelines and milestones, determining dependencies and resources. It is the basic functionality of project management for P(V)E schools and, therefore, it is essential. It may not be so important, however, for organizations with simple, short-term projects, recurring tasks or small teams.

It must be noted that the function of *time management* has some limits because of its specific features. In P(V)E schools, it can be applied only to some projects, namely, to fulfil specific tasks with an indefinite or definite deadline. Thus, such software tracks the actual time needed to complete a project task and is valuable for long-term projects.

In project management in P(V)E schools, they mainly use freeware and shareware software. One should pay particular attention to **Trello** (2019). It is the software using the board method (*see Fig. 3*) when each whiteboard is a project with cards inside it. Cards are tasks that can be moved to different points within the project. Each card contains a list of project performers, due date and the recorded expected result. It must be noted that when registering in Trello, one can choose the area that is most suitable to the needs of professional (vocational) education. The point is

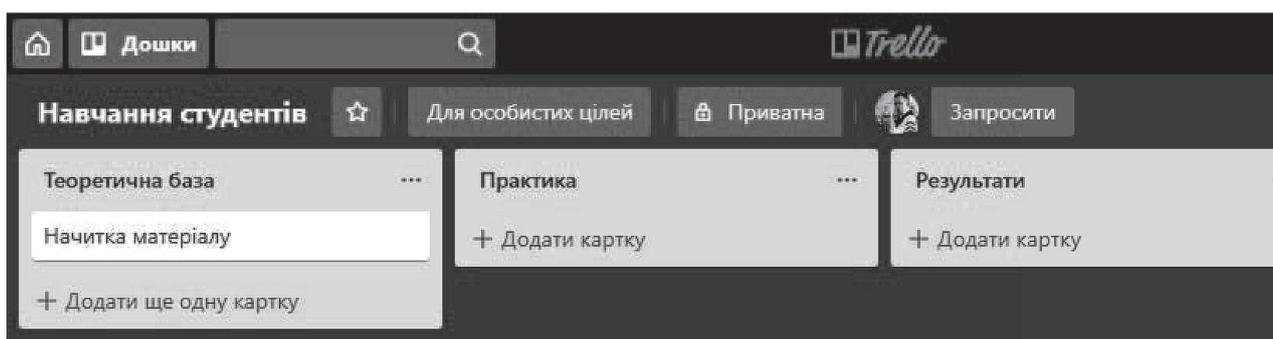


Fig. 3 A board for project management

that the software interface is usually understandable due to many language settings, including English and Ukrainian. The interface is customizable, too.

A simplified mechanism for involving project performers in teamwork is essential for the proper implementation of projects in P(V)E schools. Indeed, each card has its e-mail address. An e-mail sent to it will allow one to create a corresponding card with the subject of the e-mail and involve those to whom the e-mail was sent. Thus, when one adds a new card, he or she can also add members (performers) by typing in the search box the e-mail address of the person to be involved in the task. Besides, the settings include the ability to graphically highlight the task and choose the colour characterizing the importance of the task. One can also change the position of the card, moving it to the completed tasks. Moreover, one can leave comments on project tasks, which provides the performers with an opportunity to understand the specifics of the project task better.

It must be noted that this software belongs to online platforms and is shareware. It allows one to create any number of boards for project activities, cards, to-do lists, checklists and applications. However, the max size for attachments cannot be more than 10MB. Besides, it lacks the function of reports on the implementation of projects.

**Bitrix24** (2019) is widely applied for project activities in P(V)E schools, too. It is a professional software with many functions, aimed at integrated project management and cooperation with performers and clients depending on the specifics of P(V)E schools (see Fig. 4).

This software aims to improve the cooperation in P(V)E schools since it combines various means of communication in a single software solution. It is expressed through a built-in chat and video conferencing tool for real-time communication. The built-in features include calendars, both private and shared. **Bitrix24** can turn the sent email into a task for the project members and also function as a private social

network. Users can collaborate through document sharing and storage. An essential element of this software is a full-fledged personnel management system, work reports and workflow automation.

The function of cooperation is rather useful for P(V)E schools since it incorporates time management tools and allows one to set start and end dates for each project member. Based on this, **Bitrix24** automatically tracks the time of task completion as well as the display of project tasks in Gantt charts. Project members can plan project activities, manage resources and track work progress.

The monitoring of project activities is possible with the help of project reports and task counters within the project. Other functions include ready-made templates, recurring tasks, dependencies between project tasks, checklists, custom fields for tasks.

This software has an integrated support team and contact centre that can assist clients in real time. The multichannel contact centre includes chat, telephony, email, social networking and instant messaging.

One should also pay specific attention to a website creation tool that allows creating free websites, landing pages, online stores.

**Bitrix24** comes with a shareware programme that is limited to 12 users and 5GB of storage. It is equipped with automation features, email marketing integration and file sharing. The main features of the free version include task management, resources, Kanban boards, which helps to conduct activities and prepare project task reports. It has 5GB of project memory within the file-sharing project, project marketing, as well as the use of email, automatization mechanisms.

Taking into account all the challenges put before P(V)E schools, the most functional software is **Microsoft Project**, which is a specialized software tool designed for project management. It allows one to plan projects, track their implementation, collaborate with participants without being tied to a specific workplace. The programme provides real-time communi-

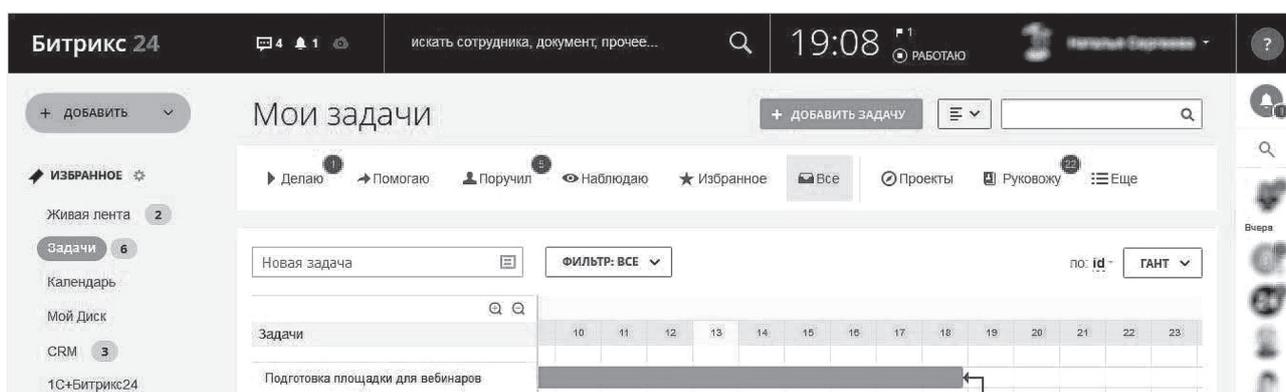


Fig. 4 The contacts menu in Bitrix24

ation, and instant messaging within the project plan via Skype for Business and consolidates all potential project resources in a single task. **Microsoft Project** is divided into two versions: standard and professional. The main difference between them is only the more advanced features and the ability to use Office 365 in the professional version. It is shareware, with a trial period of 14 days, after which it is proposed to purchase the software. With this in mind, it is necessary to highlight some of its key elements. Thus, the first time the software is used, the user will be prompted to create a new project (see Fig. 5) or to choose an online project template by searching for keywords.

After choosing the required template, the user goes to the work area of the programme, which consists of tabs, such as task, resource, report, project, submission, help, format and auxiliary search module (see Fig. 6). Each tab is responsible for a specific area of action in the project. It must be noted that the tabs are user-friendly and arranged in a logical sequence.

Given this, it is suggested to consider the process of creating a project based on a template. After launching the programme, one should click “create” and then choose the template that most closely matches the type of project activity. To do this, one goes to the

field “Search for online templates” and chooses one of the options given. After that, one should decide on the start date of the project and click “create”. Finally, one should set up the project itself, that is, set key project parameters in the project details window (menu item “project/project details”). This menu item determines the consequences of the planning process.

**Microsoft Project** offers two options for project planning. First is the start date of the project. It becomes the directive start date for the project itself. The rest of the work is scheduled as early as possible, meaning they have a possible start date. The project completion date is a calculation date and cannot be manually modified (see Fig. 7).

The calendar field sets the calendar (schedule) of working time that will be used when planning work. In doing so, one should choose the calendar which P(V)E schools use. Based on the chosen template, project actions are proposed to complete the project. It must be noted that all project activities can be adjusted by adding, deleting and modifying tasks and their duration depending on work needs.

One should pay attention to such features as adding and removing project tasks. One needs to open “submissions” in the programme tab and click “Gantt

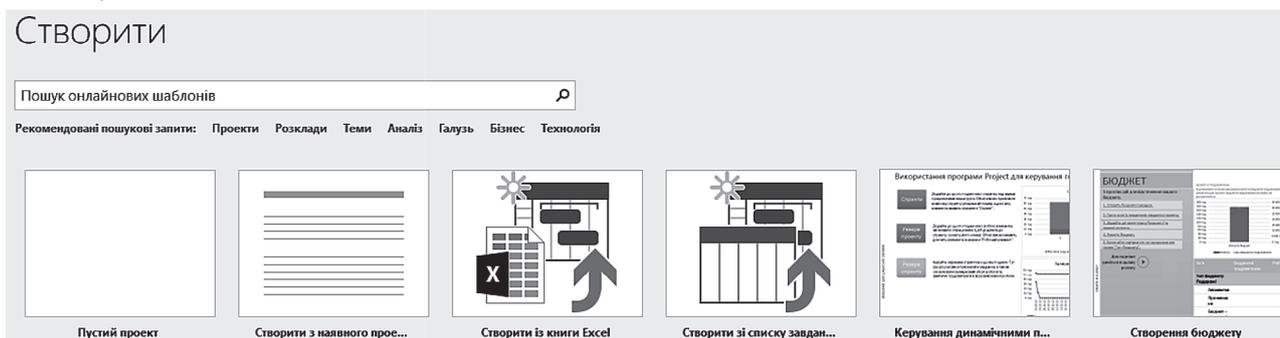


Fig. 5 Creating and searching for online project templates

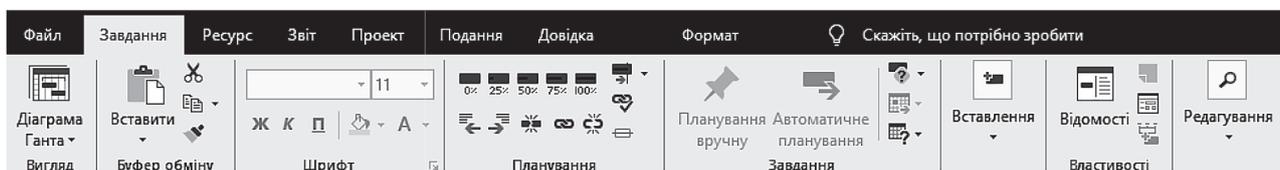


Fig. 6 Tab sequence in Microsoft office 2019

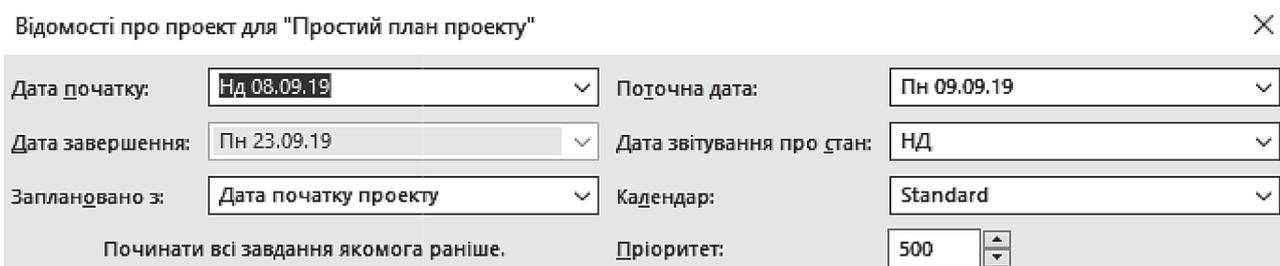


Fig. 7 Information about the project

chart” to add tasks to an existing project. It will show the project activities graphically. After that, one should type in the name of the task, the number of days it will take and determine the performer. If the performer is overloaded, a “red man” icon will appear in front of the project line (see Fig. 8)

One can add project members clicking tab “resources”, “assign resources” (see Fig. 9)

It is necessary to pay attention to a graphical representation of the project itself, which is presented as a timeline (see Fig. 10). It shows multiple timeline bars with date ranges. A well-formatted timeline is a valuable material when providing information to stakeholders and partners. Some formatting options of the software are similar to Microsoft Word. Indeed, the style definition affects the content of the document to which that style is applied.

While the software is undoubtedly useful for production and educational activities, it does have its drawbacks. One of the significant problems that project performers face is the lack of customization.

Most software is generic and designed to work in many industries and project types, so there is currently no single software available for all project tasks. Project management software can also create an uneven focus for the project lifecycle. The project team may miss or delay essential tasks, such as goals and logical processes. When mistakes or omissions occur at the beginning of the project, they can lead to the loss of time and financial resources.

**Conclusions.** Therefore, project management software has the following essential functions. First, it is the ability to plan a project to determine its schedule, display its tasks and describe their interaction visually. Second, it is task management aimed at creating sharp deadlines for each task element and reports on the status of each key task element. Third, it is the sharing of documents and teamwork, which is realized through the repository of documents which the persons involved in the project can access. Fourth, it is the exchange of calendars and contacts: project schedules include scheduled meetings, dates of activities

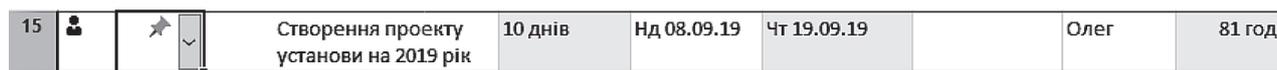


Fig. 8 A graphic representation of the completed project task

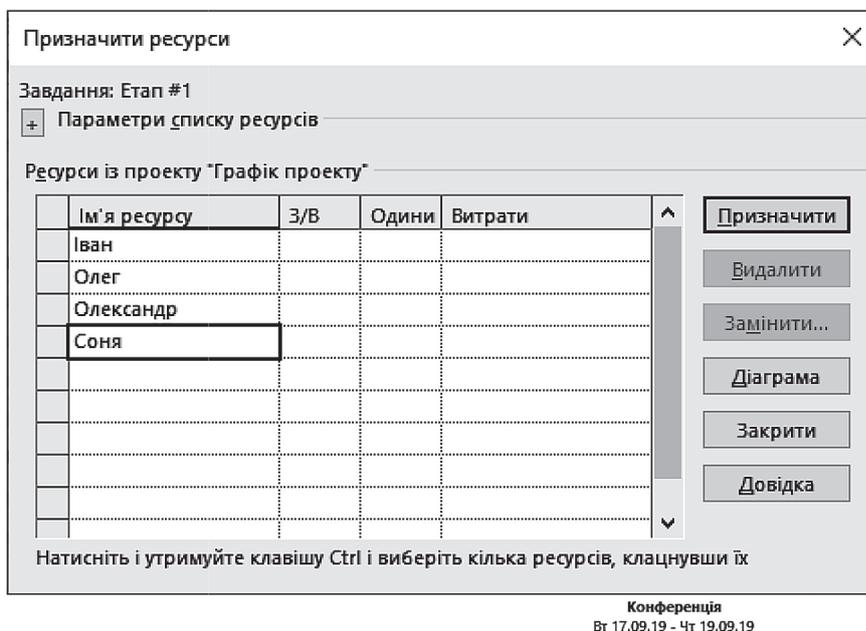


Fig. 9 A graphic view of the tab “add members to the project”

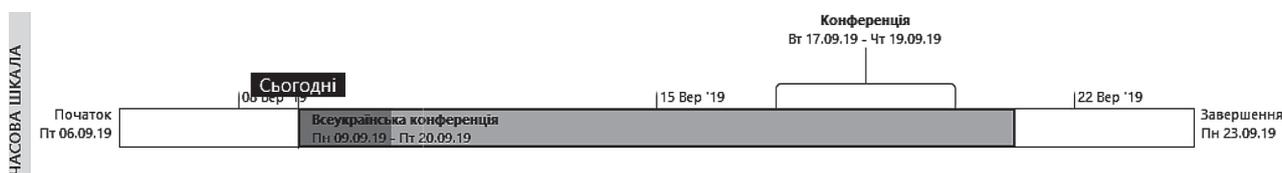


Fig. 10 A timeline in Project Management

and contacts, which should be automatically updated on all the calendars of the persons involved in the project. Fifth, it is the management of shortcomings and unforeseen consequences. With this in mind, the software facilitates reporting in situations when one can analyze the links between action, consequence

and performer. Sixth, it is the tracking of time spent both on the project and each task in the project. It is also vital for the stakeholders of different projects. Thus, the software is aimed at simplifying project management in P(V)E schools.

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## Програмне забезпечення управління проєктами у сфері професійної (професійно-технічної) освіти

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### Реферат.

*Актуальність.* Діджиталізація суспільства та освіти змінила підходи до управлінської діяльності, що помітно в частині управління проєктною діяльністю в закладах професійної (професійно-технічної) освіти. Це зумовило спрямування ресурсів на забезпечення ефективного функціонування закладів професійної (професійно-технічної) освіти, випередження ними конкурентів на основі безперервного вдосконалення своїх внутрішніх процесів та розширення спектра освітніх послуг, які вони надають здобувачам освіти та дорослому населенню.

*Мета:* розкрити особливості управління проєктами у сфері професійної (професійно-технічної) освіти із застосуванням спеціалізованого програмного забезпечення.

*Методи.* Метод аналізу програмного забезпечення для управління проєктною діяльністю. Із використанням даного методу було здійснено диференціацію програмного забезпечення на структурні елементи. Це слугувало встановленню взаємозалежних зв'язків між елементами програмного забезпечення як системи. Використовуючи зовнішню і внутрішню інтерпретації (описовий метод) та на основі методу аналізу описано особливості внутрішньої логічної побудови інтерфейсу програмного забезпечення для управління проєктною діяльністю. Важливе місце в дослідженні належить зіставному та порівняльному методам. Шляхом зіставлення було встановлено відмінності між програмними продуктами, а шляхом порівняння – тотожності програмного забезпечення для управління проєктами, на основі чого визначено його специфіку.

*Результати:* окреслено перелік та ключові характеристики програмного забезпечення для управління проєктною діяльністю у сфері професійної (професійно-технічної) освіти.

*Висновки:* планування проєктів у закладах професійної (професійно-технічної) освіти слугує для графічного відображення графіка завдань проєкту й візуального опису взаємодії його внутрішніх завдань; спільного використання документів та роботи в команді, що реалізується за допомогою центрального сховища документів; обміну календарями та контактами: графіки проєкту, дати діяльності та контакти, що повинні автоматично оновлюватися у всіх календарях осіб, які здійснюють проєктну діяльність; управління невдачами та непередбачуваними наслідками.

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**Ключові слова:** управління проєктами, програмне забезпечення, проєктний менеджмент, професійна освіта, метод критичного шляху, діаграма Ганта, Trello, Bitrix24, Microsoft project.

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