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Activation of independent work of students through «cloud» services

АКТИВИЗАЦИЯ САМОСТОЯТЕЛЬНОЙ РАБОТЫ СТУДЕНТОВ ПОСРЕДСТВОМ «ОБЛАЧНЫХ» СЕРВИСОВ

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Abstract: *This article explores activation of students' independent work in extracurricular work through separate individual tasks, term papers and research projects. For independent work activation authors are offering to use "cloud" services. These services include data storage drives, various software, systems and even computers. Access to Internet and Web-browser is needed to use these services. This article explores some of these services and general principles of their application in an academic process. It is useful for faculty members, Computer Science teachers, as well as for others interested in up-to-date information technologies.*

Аннотация: *в статье рассматривается вопрос активизации самостоятельной работы студентов во внеаудиторной работе: индивидуальное задание, курсовая работа, исследование. Авторы предлагают использовать для активизации самостоятельной работы «облачные» сервисы. Эти сервисы включают диски для хранения данных, различные программы, системы и даже компьютеры. Для полноценной работы с этими сервисами достаточно иметь доступ к Интернет и браузер. В статье рассмотрены некоторые из этих сервисов и очерчены общие принципы их использования в учебном процессе. Статья адресована преподавателям, учителям информатики, а также всем, кто проявляет интерес к новым информационным технологиям.*

Аннотация: *макала тышкаркы иш окуучулардын өз алдынча иштөөнү жандандыруу жөнүндө маселени карайт: өз алдынча иш, курстук иш, изилдөө. Жазуучулар өз алдынча ишти жандандыруу учун «булут» кызматтарын пайдаланууну сунуш кылат. Бул кызматтардын сактоо учун кууптар, ар кандай программалар, системалар жана компьютерлер кирет. Бул кызмат менен ишти аягына чыгаруу учун Интернетке кирүүгө жана серепчи болсо эле жетиштүү. Макалада ушул кызматтардын кее бироосуу каралган ошондой эле аларды пайдалануу боюнча жалпы негиздер белгиленген. Макала мугалимдер, маалыматтык – окутуучулар, ошондой эле, жаңы маалыматтык технологияларды кызыкдар бардык адамдарга багытталган.*

Keywords: *activation of students' independent work (SIW); information technology; cloud services; cloud computing; educational experiment.*

***Ключевые слова:** активизация СРС; информационные технологии; облачные сервисы; облачные вычисления; педагогический эксперимент.*

***Негизги свдвр:** студенттердин өз алдынча иштерин жандандыруу; маалыматтык технологиялар; «булут» кызматтар; «булут» эсептөө; педагогикалык эксперимент.*

Curriculum of J. Balasagyn Kyrgyz National University includes implementation of two extracurricular students' independent work (hereinafter-SIW) in each semester. Scope of each SIW project is determined by the faculty member and is related to academic discipline. A grade earned for SIP will impact final assessment for the discipline (examination).

Student independent projects have shared features: they are extracurricular, exploratory and oriented at researching a problem. Often this work is more complex compared to courses taken or work related to additional resources. SIW is implemented without teacher involvement, but under supervision.

R.A. Nizamov [4] defines the activation of educational activity as "the purposeful activity of the teacher, aimed at improving the content, forms, methods, methods and means of teaching to arouse interest, increase activity, creativity, students' independence in mastering knowledge, forming skills, applying them in practice" [5]. The authors agree with this definition and consider that new and modern forms of organization of independent work based on the use of new information technologies increase the interest and effectiveness of independent cognitive activity of students

But it is the purposeful activity of the teacher, aimed at the organization of students' independent work that allows to obtain the greatest effect leading to the improvement of academic performance [1,3] and firm consolidation of the professional skills.

Since 2013, Computer Technologies and Internet Department (CTID) has been using in the educational process the so-called "cloud" services, mainly for the organization of students' independent projects. The use of services allowed to activate students in the implementation of SIW and to increase their academic performance by about 15%, which was confirmed during the pedagogical experiment. The surveys showed that, in comparison with traditional learning forms, this kind of work increases students' interest in the implementation of the SIW.

"Cloud" services belong to the type of SaaS (software as a service). Simplistically, these are numerous applications and information services that are available on a modern personal computer, and transferred to Internet. Therefore, there is no need to install these programs and services on the

computer, changing their versions, and ensuring copyright procedures. All you need to have on the device (computer, smartphone, tablet, laptop, etc.) is an access to Internet and browser (Opera, Google Chrome, Explorer, etc.) [9,10,11].

Below are examples of "cloud" services:

- disks (Google drive, Yandex disk, OneDrive, etc.);
- Office programs (Word, Excel, PowerPoint, etc.);
- Programming systems (Idione, Unity, WordPress, AppInventor, etc.);
- Application systems (1C Enterprise);
- system programs and databases (Windows Azure, Unity, Oracle, MySQL, etc.);
- educational services (Google for Education, Microsoft Live @ Edu, etc.);
- Communication services (Bitrix24, Google apps for Work, etc.).

Within the framework of pedagogical theory, SIW includes four components [1,4,6,8]:

- motivational;
- volitional;
- substantial;
- control and evaluation.

This article explores the application of "cloud" services individually for each component.

Motivational component of independent work of students.

The teacher provides students in advance with information necessary for students to work with "cloud" services. This information includes the following:

- instructions for working with services;
- reminder that "cloud" technologies are new and promising technologies that are rapidly developing, and with the development of speed and reliability of Internet they will gradually displace local resources and services. It is advisable to provide some statistics. For example, Gartner estimates that by 2015 the volume of the cloud services market for US users will be over \$180billion. The total cost of equipment, which will be deployed by 2018 in the cloud infrastructure, is estimated at \$79.1 billion. In 2014, American businesses spent more than \$13 billion on the development of cloud services and hosting. The development of cloud computing,

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according to Citrix, created about 14 million jobs within two years (by the end of 2015);

- the main specialties related to «cloud» computing are network administrators, network and information communications analysts, IT security specialists, system analysts, application developers, Web developers, database administrators;
- the use of "cloud" services makes it possible to perform independent work in any place and at any scheduled time;
- "cloud" services can be used not only on a personal computer or laptop, but also on a tablet or even a smartphone (a mobile phone that has Android, iOS, Windows operating systems). For young people, this fact alone is already a strong motive [7];

Also, teachers must determine regular motivational components that are not associated with "cloud" services. For example, this might be related to a subject of study, the level of student preparation, etc.

Volitional component of independent work of students. Each teacher knows that a motivation alone is not enough to carry out independent work. There must be a will. Students must organize their work independently within the time allotted for academic work. For this, they need a will. But teachers must teach and provide the organizational support in students' performance.

Usually a work plan includes intermediate tasks and deadlines. Final deadline must be set. For students, it is a part of ongoing monitoring of the module. Teachers can also schedule consultations during the implementation of the work.

"Cloud" services also encompass services that can be used to plan and monitor the work performance. Students are recommended to create plans by themselves in accordance with the number of academic hours allocated for the implementation of the SIW. At the initial stage, it is advisable to do this through interaction with teachers. These services include the following:

- **Calendars** from "Google apps for Education" [2];
- **Calendars** from "Bitrix24";
- **Objectives** from "Bitrix24";
- **Groups** from "Google apps for Education";
- **Groups** from "WhatsApp".

Note. The reason why the authors attributed the WhatsApp service to "cloud" is that all data involved in the service is stored in the "cloud".

Teachers and students can use any of the services listed. They are all available and free of charge for educational institutions (upon registration).

Calendars allow to mark an event (work stage) for any date. Usually, the calendar has a reminder for the event.

Tasks - except for the date and the event, services have an application informing the degree of work completion and can specify the performer. Teachers can always see the degree of completion of the work by stages, and even in the form of a diagram.

Groups - are designed for prompt interaction of students with each other and with teachers.

All listed services are available on smartphones, and thus, increase the efficiency. In addition, teachers can always be aware of the current work performance, which contributes to students' sense of responsibility. **Subject-matter component of SIW.**

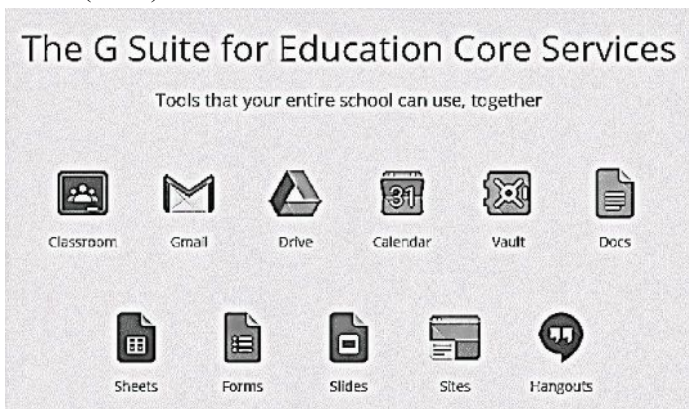
"Cloud" services enable teachers to upload assignments, methodological materials, instructions and links, and necessary electronic resources. Services enable students to publish the results of their work in an accessible location. Moreover, it can be done at any time, in any place where there is an Internet and an access device.

Teachers can use various "cloud" services to upload and use resources depending on subject-matter and the forms of organization of independent work. The following services were applied at CTID:

- *Google for Education* (disk) - for posting assignments, methodological materials and instructions, results of work, without any limits;
- *Google for Education* (office programs) - for design of work results and publication of presentations;
- *Google Apps Education* (groups) - for interaction of teachers and students regarding publication of ads;
- *Google Apps Education* (classroom) - for publication of courses;
- *Google Apps Education* (sites) - for prompt development and placement of student sites;
- *Bitrix24* - to upload tasks, methodological materials and instructions, results of work, without limits, and to hold online communication of students through built-in chat;
- *edu.Icfresh* (1C Enterprise) - ready-made "cloud" solutions 1C, which are used in "Programming Systems" and "Accounting" courses;

- *ideone* - a programming system for 77 algorithmic languages;
- *WordPress* - the designer for development of sites;
- *MIT App Inventor* - for development of mobile applications under OS Android.

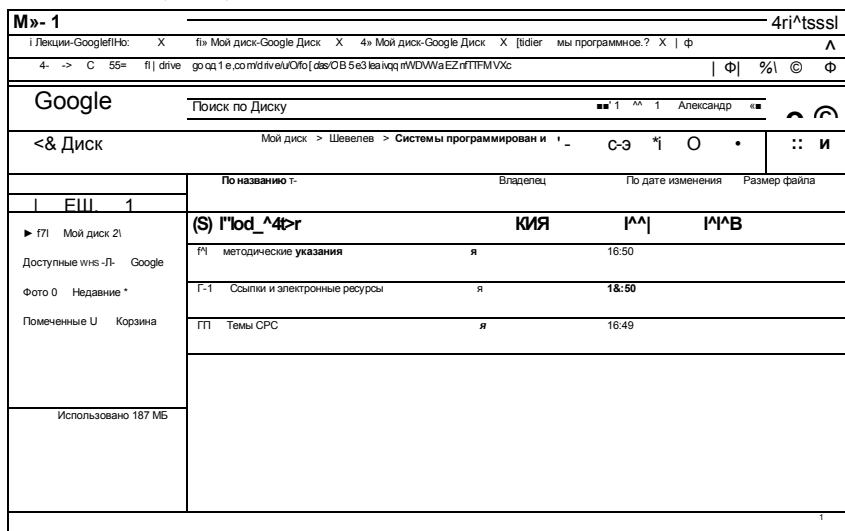
Brief content of *Google for Education* (drive) service is provided o screenshot below (Pic.1):



Pic. 1. Screenshot of Google for Education “cloud” service content

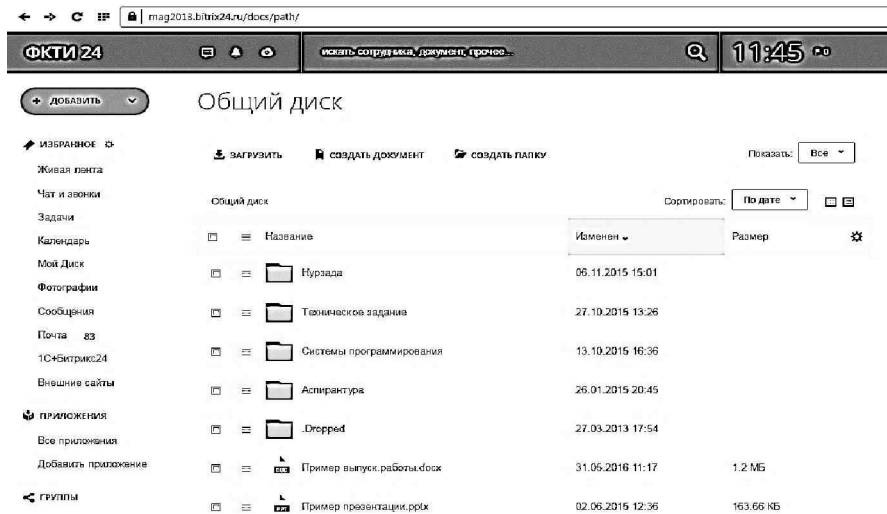
Note: Presently, (in 2017) *Google for Education* service is not available in Russian. In 2015 Russian language was active. Cause is unknown.

Example of *Google for Education* (drive) service is shown on a screenshot (Pic.2) below:



Pic. 2. Google for Education (drive) “cloud” service page screenshot

Example of Bitrix24 service is provided on a screenshot (Pic.3) below:



Control and evaluation component of SIW.

Thus, the article examines the final control of students' independent work only. Entry and intermediate controls were not used.

For CTID, textual description of the work and its presentation present SIW result. In Programming or Information Systems courses, apart from textual description and presentation, students must present program or system they have developed. For other departments, this can be done in a different way.

The textual part is prepared by each student through the "cloud" Google document. The presentation is made by a student alone, if s/he worked individually, or a team leader, if it was a team effort. The presentation is prepared through a "cloud" Google presentation. The presentation is then defended by a student or team leader.

Presentations are evaluated by the students anonymously, and by teachers. The final assessment is made by a teacher due to account taken by anonymous opinions.

For anonymous students voting, a "cloud" service form is used from *Google for Education*. For this, teachers prepare a survey and evaluation criteria. Students receive evaluation forms to their smartphones, and they must score presentations on a 10-point system (Fig. 4):



Pic.4. Screenshot of the evaluation form on smartphone display. The results are transferred to the "cloud" disk, into one file, in the form of an Excel Table. The results can be corrected by manually adding the formula for recalculation to another system other than the 10-point system, for example, to a 20-point system (Fig. 5):

форма для БИ-2 (Ответы) ☆					
Файл Правка Вид Вставка Формат Данные Инструменты Дополнения Справка В Комментарии					
fx р. % 0.00 123 Arial 10 B I A ☒ ☒ Д					
	A	B	C	D	E
1	Отметка времени	Реальность	Оригинальность	Функциональная полнота	
2	09.02.2016 9:13:33	8	7	6	14,0
3	09.02.2016 9:37:16	9	7	6	14,7
4	09.02.2016 9:39:16	7	9	9	16,7
5	09.02.2016 9:40:28	9	6	5	13,3
6	09.02.2016 20:09:46	9	6	8	15,3

Pic.3. Screenshot of the table with polling results and recalculation of points.

The teachers also evaluate presentations. The final score is equal to the average value and is also posted on a cloud disk that is publicly available to this group, but not available to others.

Thus, in all four components of students' independent work, "cloud" services were used. It must be noted that availability of services on smartphones has added attractiveness for students.

Unfortunately, there are some limitations to widespread use of the methodology in Kyrgyzstan today. These limitations include slow Internet, fairly high prices for smartphones (tablets), as well as expensive mobile communications. But given rapid development of mobile and Internet technologies, these restrictions will soon stop being an obstacle to the introduction of this methodology.

The experience of using this method to activate students' independent work through "cloud" services really gives positive results, which lead to higher estimates (about 15%), in contrast to the standard approach. This was shown by the pedagogical experiment conducted in 2014-2016.

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