



OVERVIEW OF THE PROJECT V-NAST2019

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Abstract:

The Project V-NAST2019, funded by the Ministry of Education, Science and Technological Development, was achieved through five workshops each presenting the necessary steps towards a successful transition from traditional learning to hybrid or/and online learning. By attending the workshops, lecturers/associates at the Belgrade Polytechnic had the opportunity to gain knowledge about the possibilities of innovative forms of teaching supported by modern digital technologies as well as the "how-to" and "know-how." Also, acquaintance with new technology imposed new pedagogical approaches that differ from those found in traditional teaching. The intention of these new pedagogies is to promote a humane and ethical approach for the common good, which is an essence of educational goals for everyone. Therefore, educational technology should ensure student engagement as well as the institution's responsibility to participate in the global knowledge network. The new pedagogy seeks to encourage such engagement by ensuring the presence of interactive social dynamics in educational media spaces. The hybrid interaction between humans and virtual agents provides a real learning experience in the shared lifelong learning domain. By realizing the V-NAST2019 project, insight was given toward strategic goals and key issues that should be addressed at an early stage in the development of online teaching. The five workshops involved: strategic planning, content creation, preparation of lectures, selection of technologies, and methods of analyzing the success of teaching and student progress. The following platforms were considered for technology selection: Canvas LMS, Google Classroom, and Moodle. As a result of the project, a model of hybrid teaching was created and applied to the class CAD2 - teaching PTC Creo Parametric. From this implementation, evidence emerges that supports the benefits of hybrid teaching and the positive effects on student engagement and achievement.

Keywords:

hybrid learning, e-learning, virtual learning, LMS, flipped classroom

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1. INTRODUCTION

The ubiquity of digital technologies has profoundly changed almost all aspects of human life. The way we communicate, the way we work, the way we enjoy our free time, the way we organize our lives and the way we transfer knowledge and information.



The way we think and behave has also changed. Children and young people grow up in a world where digital technologies are part of everyday life. They do not know, nor can they know otherwise. However, this does not mean that they are naturally endowed with the appropriate skills for the efficient and conscientious use of digital technologies.

The educational staff is a role model, someone to look up to, for every next generation of students. Therefore, it is crucial for teachers to possess certain digital competencies to be able to actively participate in the digital society.[1] The European Digital Competence Framework for Citizens (DigComp) specifies these competences. DigComp has become a widely accepted tool for the evaluation and recognition of digital competences and has been used as a basis for teacher training and professional development across Europe and beyond. As citizens, educators must possess these competencies to participate in society, both personally and professionally. As role models, they must be able to clearly show students their digital competence and convey their creative and critical use of digital technologies.

However, teachers are not just role models. As professionals committed to teaching, in addition to general digital competencies for living and working, they also need digital competencies specific to teachers in order to be able to use digital teaching technologies effectively.

When it comes to online programs, they differ in many key elements. Fig. 1 shows a set of dimensions that define online programs. These dimensions describe whether the online program will be complementary or fulltime; geographically how far it reaches; what is the organizational type and operational control; location of classes and type of classes. Some of these attributes can be combined or applied continuously (e.g. location and type of teaching).

2. THE PROJECT V-NAST2019

Currently in Serbia, there are no clearly defined, complete trainings or courses that would serve the professional development of teaching staff in preparation for some form of innovative teaching (virtual teaching, flipped classroom, blended learning). The project V-NAST2019 was realized through a workshop of courses and trainings that enabled each teacher to improve teaching by adopting new competencies and pedagogies, as well as by using modern technologies and trends in education. Within the project, workshops and trainings were held for professors/lecturers and associates of the Belgrade Polytechnic. In further work, similar activities are planned for teachers/educators from other interested institutions (educational or business), aiming to improve teaching /training in a much larger population, and as a consequence to raise and improve digital competencies and professional development of all attendants and their institutions (schools, colleges or companies).

The implementation of the project defines guidelines for the practical application of hybrid forms of teaching in the sector of higher education. The V-NAST2019 project has set out the following goals:

- ♦ to inspire lecturers, researchers and management staff to design and implement actions that would exploit the potential of digital technologies to expand participation in education,
- ♦ encourage innovation in education and training,
- ♦ improve the conditions of lifelong learning,
- ♦ transfer new (digital) skills and competencies needed for employment, personal development and social engagement.

The project V-NAST2019 was realized through five work-shops during which lecturers/associates at the University of Belgrade Polytechnic had the opportunity to gain knowledge about the possibilities of innovative forms of teaching supported by modern digital technologies (TEL - Technology Enhanced Learning).[2]

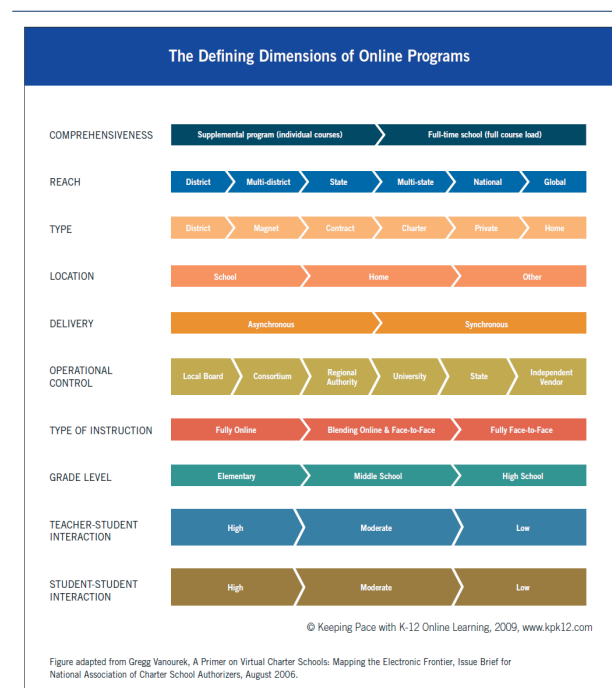


Fig. 1. Defining dimensions of online programs



Also, new pedagogical approaches that differ from those in traditional teaching are described. New pedagogical approaches should promote a humane and ethical approach to the common good, which is essential for every educational goal for everyone. Therefore, educational technology should ensure the engagement of students as well as the responsibility of the institution to participate in the global knowledge network. New pedagogy seeks to encourage such engagement by ensuring that interactive social dynamics are systematically present in educational media spaces. Hybrid interaction between humans and virtual agents provides a real learning experience in a common lifelong learning domain. [3]

Workshops and courses held within the project V-NAST2019 provide insight into strategic goals and key issues that need to be addressed at an early stage in the development of online teaching. They are divided into five parts: strategic planning, content creation, lecture preparation, choice of technologies, methods of teaching and student progress analysis.

Organized Strategic Planning

At this stage, the essence is to consider certain issues that determine how online teaching will be further realized and developed. It is important that all participants are engaged and that a decision is made on the issue of defined educational goals for the selected group of students. The first question that arises is which subjects should innovation be introduced. This is important because the specifics of the case determine how the realization of its online adaptation will be approached. It is also important to determine whether a mixed form of teaching, supplementary online teaching, full online teaching or a mixture of all these forms will be developed. Other issues that arise and need to be addressed at this stage relate to:

- ◆ how to manage the process of change in the organization;
- ◆ how to influence on the role of lecturers and students, as well as on the use of time;
- ◆ what goals to set in terms of teaching individualization for students;
- ◆ whether adapt online teaching to the traditional teaching calendar;
- ◆ will the online classes be open or closed?

Regardless of any case, student-centered learning dominates at this stage is.

Preparing Teaching Content and Materials

Before preparation of any specific teaching materials and content, it is necessary to make certain strategic decisions. When it comes to generating content, the questions that may arise are whether to build your own content, whether to buy it or a bit of both? The answer to this question depends on many variables, which include: expertise of the teaching and/or administrative staff, time and resources needed to create content, time to launch the course, funding to run and/or maintain existing online courses, the need for adapting the courses, compatibility with the goals, mission, and vision of the school, and it certainly depends on the unique needs of the students. When purchasing certain content, it is necessary to consider whether it is the entire curriculum (comprehensive content), individual course or individual teaching units, lessons and other objects. Open educational resources (OER) can also be used, but should be considered in advance. How will the quality of online content be assessed is a also frequently asked question. Local or national quality standards for online content (if defined) can be used for this. In addition, the educational institution should develop or harmonize its own standards with those recommended regarding the quality of online teaching. In general, these standards should include:

- ◆ *Content* - The course should provide online students with more ways to engage and connect with learning experiences that promote content mastery and are in line with national standards.
- ◆ *Teaching design* - courses are defined to use activities that encourage student engagement and active learning, while providing more learning pathways based on students' needs. Also, there should be options for student-student, teacher-student, and student-teacher interaction.
- ◆ *Student evaluation* - courses should have several strategies and activities by which the student's readiness and progress during the course can be evaluated.
- ◆ *Technology* - The course should take full advantage of a variety of technological tools, have a user-oriented interface and meet interoperability and accessibility standards for students with special needs.
- ◆ *Course evaluation and support* - courses should be evaluated regularly for effectiveness. For this purpose, various strategies can be used, as well as those in traditional teaching. It is necessary to constantly improve, both the content and how the technology is used.



The quality of each teaching must be related to the learning outcomes. This can be linked to the online course curriculum. During the final course of the project V-NAST2019, we have clearly presented mechanisms that can be used within the Canvas LMS platform.

Educator Role

Student success comes from the quality experience in the classroom, regardless of whether the classroom is physical or virtual. However, online teaching requires additional skills that need to be defined and developed (it is also valid in a hybrid form of teaching). Compared to a conventional teacher, the role of the virtual (on-line) teacher is more oriented towards directing and individualizing learning; on engagement in efficient digital communication with students; to evaluate and grade students using unique online tools; and in some cases, is oriented towards the development of content and structure of the online course. When the development of these skills is combined with the desire to give students more flexibility over time, place, path and pace of learning, then it becomes clear what the teacher needs to become more effective in an online course.

As the field of online learning expands, it is becoming increasingly clear that online learning requires a new and different set of skills compared to the traditional form of teaching. In developed countries, in addition to the usual teaching requirements, there is already a need for professional development or certification of online lecturers.

During implementation, the project V-NAST2019 was mostly focused on this phase. However, other phases were not excluded in the realization itself. The courses defined during the project were aimed at developing new knowledge and pedagogical skills in combination with practical application. These courses cover a wider range of information, as well as a deeper understanding of the roles of online teachers, online students, as well as the application of online learning tools. Through hands-on exercises and assignments, teachers have acquired new methods how to transfer knowledge and contents of their teaching, how to communicate and evaluate in a specific way. Support to the teaching staff during the first year of conducting a hybrid form of teaching was reflected in providing structures for communication, “brainstorming” solutions, and exchange of experiences. This is a general strategy for building an online teaching staff.

Teacher classification	Role		Sub-role
Traditional	Teachers who believe that technology has none or very little impact on their teaching, except to serve for converting text and images into visuals.		
	<i>Instructional Roles</i>	Advisor	Support and advise students on how to realize their projects. Encouraging student engagement, interaction between students, and further clarification of lectures
		Instructional Designer	Use available resources to enrich lesson/individual activity in lesson design/team design
		Collaborator	Collaborate with colleagues to create activities or exchange of ideas
		Teaching Team	A group of teachers - a team, acting to set goals for a teaching unit so that teaching is performed with technology; also, plans individual lessons, teaches students, evaluates results
	<i>Technology Role</i>	Instructor	Support to participants in the use of technology / Modeling the use of technology for project implementation / Student support
		<i>Social Role</i>	Communicator
	<i>Organizational Role</i>	Team Coordinator	Negotiating a learning program; time-tabling of learning activities and tasks; clarification of procedural rules and decision-making norms.

Table 1. Potential roles of teachers in online teaching
(source: doctoral thesis – in preparation)



During the realization of the project V-NAST2019, there were teachers who believed that technology had no influence on their teaching and that it only served to convert written material into visual material. For other teachers, depending on the subject matter, new roles have emerged and are presented in Table 1.[4,5]

The final course of this project was a one-on-one mentoring program that enabled teachers to learn from each other, but also a constant connection with the mentor. The impression of most teachers who have realized the online version of their teaching is that the first year of online teaching is very similar to the first year of teaching, in general.

Technology Support to Hybrid Learning

Although online teachers often point out that the focus of online learning is the teacher rather than the computer, technology systems are clearly an important component for online teaching. Computer hardware, software, and connectivity are basically the benefits of online or hybrid learning, just as are classrooms and school buildings. These tools not only provide information and data for program management, but also help teachers become more innovative and efficient in their work.[6] In any case, the goals of education should determine the choice of technology.



Fig. 2. LMS rating according to TrustRadius.com
(source: <https://www.trustradius.com/learning-management-lms>)

To date, many studies have been made regarding the flipped classroom approach. There are many success stories in which the flipped classroom has successfully encouraged student motivation in learning activities. In this case, students have a greater obligation to learn independently as well as the opportunity to manage a video lecture outside the classroom.[7] In addition, through flipped classroom activities, students can establish interaction with the lecturer by providing instant feedback and corrections within given tasks. Today's internet speeds, even with minimal hardware, are sufficient for timely and smooth communication. Students also have the opportunity to follow online classes through developed mobile applications on their mobile devices. Also, through the same applications, they could post comments and questions on discussion panels. Answers were usually posted by the teacher, but it happened that the students themselves posted answers to each other's questions.

From the point of implementation, many LMS platforms were considered for the project. Among the most commonly used are: Blackboard Learn, Brightspace, Edmodo, Google Classroom, Moodle, Docebo LMS, Articulate Storyline, Sakai, Talent LMS. For the implementation of this project, three platforms were considered: Moodle, Google Classroom and Canvas LMS. The selection was determined on the rating basis displayed on the "TrustRadius" website (presented in Fig. 2). The strongest selection criterion was the availability of a free version.

Figure 3 shows a comparative view of the three selected platforms. The criteria by which they are compared relate to content creation, content management, creation and evaluation of tests, evaluation and assessment of student papers, teaching management, collaboration tools, student and teacher portals, as well as opportunities to monitor student progress and course analysis.



Fig. 3. Comparative rating review of selected LMS platforms
(source: <https://www.trustradius.com/compare-products/canvas-vs-google-classroom-vs-moodle>)



3. THE CANVAS LMS PLATFORM

The Canvas LMS platform is on the rise and one of the most popular at all levels of education. World research shows that a large percentage of high schools and universities (mostly based on American soil) are increasingly switching to this platform. [8,9,10] The possibilities this platform offers are really impressive. The following figures show the basic processes of creating an online course with Canvas. For lecturers new to teaching in Canvas LMS, we have provided essential resources so they can create an account, create a new course, add content to the course, etc. The flowchart in Fig. 4 visually explains the process how teachers create and log into a Canvas account.

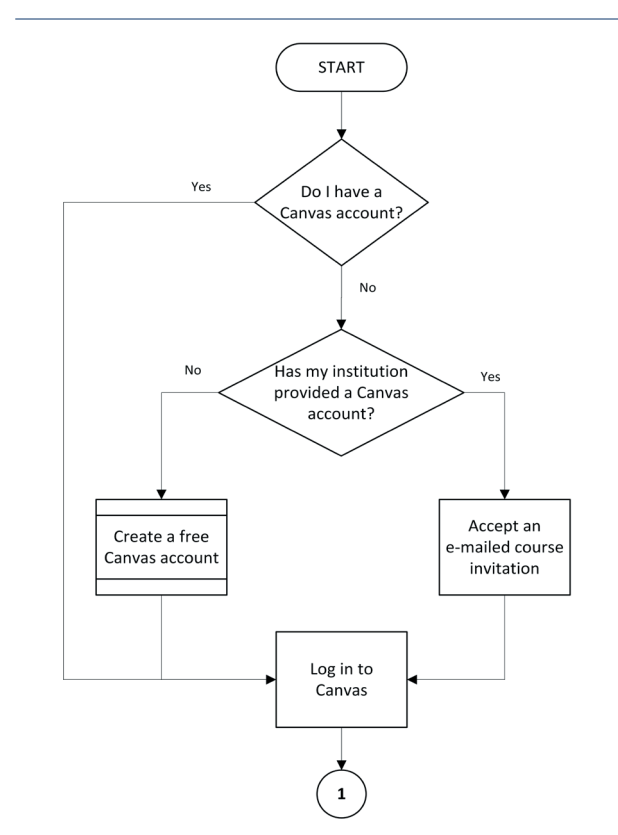


Fig. 4. Creating an account and logging in to Canvas

When logged into a Canvas account, teachers access exist-ing courses, create new courses and content. Creating content assumes creating text, audio/video material, presentations and other type that relate to lectures, tutorials, procedures, etc. The process of creating a new course is presented in Fig. 5. If a course has been setup earlier and taken over by a new teacher it should undergo a checkup in order to determine whether it should modified/updated with new material.

The process is illustrated in Fig. 6.

For the project V-NAST2019, we have developed a 10-step setup for developing and publishing a course using CANVAS LMS:

1. *Settings* – with Canvas there are options for customizing course settings by adding display names, profile images, and/or changing time zones.
2. *Notifications* – allows teachers to tell the system what information they want to be sent outside of Canvas, how often, and where.
3. *Accessing a Course* – when teachers log into Canvas, they can access their courses under the Course Menu. Also, they could find other courses they have been scheduled to teach.
4. *Syllabus* – this is where teachers post a course description, a brief introduction, class guidelines, weekly reminders, as well as other important information. Usually, we have recommended using the syllabus as the home page of the course.

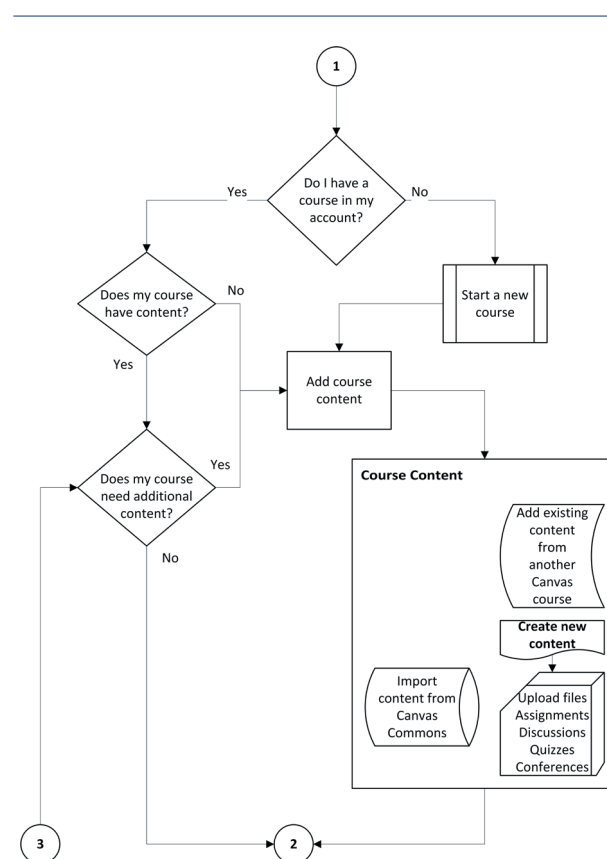


Fig. 5. Starting/Editing a course

5. *Assignments* – should be named, provide task content, a due date and total points if possible. Extra credit assignments can also be defined so they can be calculated as extra points.



6. *Modules* – modules represent a learning unit, but teachers can also break their course into Chapters, Weeks, Sections, etc.). The module usually consists of items and content. Items can be quizzes, assignments, discussions and the content itself (the lecture – one or more), such as PowerPoints, Word documents, webpage links, or texts and videos and content links (web pages within Canvas).

10. *Publishing* – to see the course online and make it accessible, it's status has to be set to Publish. Drafts and unpublished items will not be published by publishing the course. These must be published individually.

4. CONCLUSION

The realization of a hybrid learning environment for the subject CAD2, results in evidence that supports the advantages of blended learning in higher education, as well as positive effects on student engagement and achievement. This type of learning provides students with the opportunity to learn in a variety of ways. From the analytics provided by the Canvas platform, it is clear that students approach learning material when it suits them best. Although most students fulfilled their obligations regularly and on time, there were a minority that did not. Moreover, it would be naive to expect 100% of students to complete their online course assignments on time.

Students had the most positive comments regarding engagement, especially about the quality of classroom utilization. It has been noticed that classroom activities activate thinking at a higher level. As basic elements of modeling have been mastered at home, students had enough time to engage in some research in product modeling. In addition, the online environment has allowed students to stay at higher levels of Bloom's taxonomy for extended periods of time.

The first generation of 40 students attended a hybrid learning class of CAD2. Compared to another similar subject (CAD 1, in the traditional class), students ranked the hybrid CAD2 slightly higher than traditional. The comparison is shown in Table 2 and evaluated according to the Likert scale.

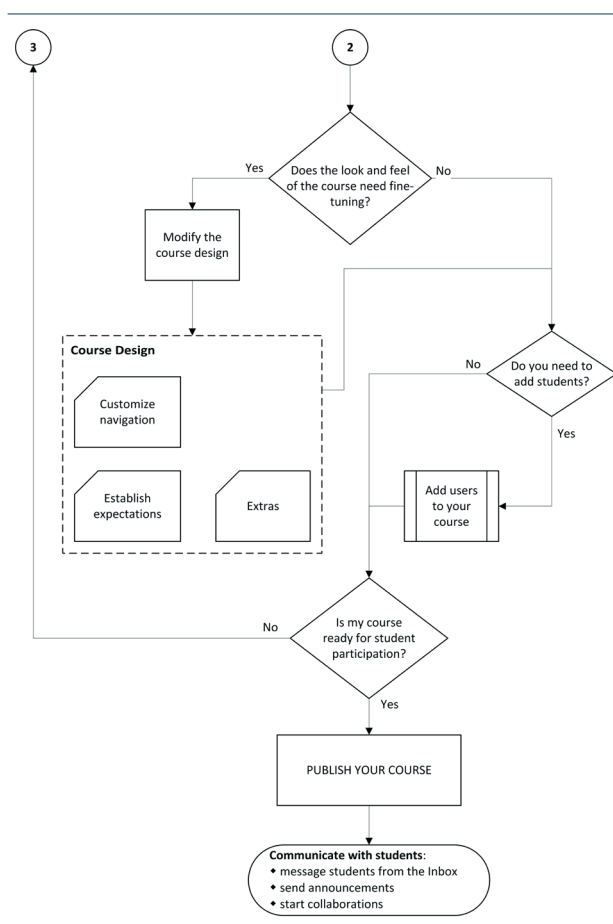


Fig. 6. Modifying the look and feel, adding students and publishing the course.

7. *Course Navigation* – navigation should be simplified for students by hiding unneeded navigation links.
8. *Homepage Layout* – the homepage of the course can be customized, by creating a unique page, or using the Syllabus, Modules, or Assignments as the homepage.
9. *Testing the course* – prior to publishing the course, teachers are advised to test their course as a student. The Student View option enables a full test.

	Online	F2F
Does the course meet the set goals	3,90	3,74
Feedback from instructor	4.00	3,73
Community building with classmates	3,62	3,50

Table 2. Students' evaluation of online and traditional course

Compared to previous generations (generations that attended CAD2 in a traditional manner (F2F class), the generation that attended the hybrid class CAD2 mastered the material faster and at a much higher level.



For example, the generation attending the hybrid learning course has acquired certain skills and knowledge for modelling complex virtual 3D models already by the fifth week of the course, whereas previous generations could do the same but end of the course.

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