

**Veselina Nedeva**

PhD in Informatics, Associate Professor  
Trakia University, Faculty of Technics and Technologies,  
Department Electrical Engineering, Electronics and Automation, Yambol, Bulgaria  
ORCID ID 0000-0002-4082-1896  
*veselina.nedeva@trakia-uni.bg*

**Snejana Dineva**

PhD in Biological Science, Associate Professor  
Trakia University, Faculty of Technics and Technologies, Department Food Technology, Yambol, Bulgaria  
ORCID ID 0000-0002-4655-6640  
*sbdineva@abv.bg*

**Zlatoeli Ducheveva**

PhD in Pedagogy, Assistant Professor  
Trakia University, Faculty of Technics and Technologies,  
Department Electrical Engineering, Electronics and Automation, Yambol, Bulgaria  
ORCID ID 0000-0002-1809-467X  
*zl.ducheveva@abv.bg*

## STUDENTS IN BLENDED LEARNING BY FLIPPED CLASSROOM APPROACH

**Abstract.** The article presents the Flipped Classroom approach and its application at the Faculty of Techniques and Technologies (FTT) - Yambol, based on the training in the subjects "Programming and Use of Computers", "Food Contaminants", and "Object-Oriented Programming" in the 2016-2018 academic years. For the students, the problem is to filter some sources that are not reliable. In the new digital age, the lecturers expect them to be creative and to prepare their assignment using new approaches. When students follow their lecturers' instructions concerning the literature and resources their projects tend to be more successful. This is one of the issues we encounter in preparing students for their classes. The second problem that we want to solve is the presentation of information using the "pouring in the bank" approach, where students are offered lectures and tutorials without being able actively to participate in the learning process. The students are trained to acquire knowledge without placing and solving problems and looking for new solutions. The article goals are to analyze the approach that we apply to the students' training to stimulate their activity in learning the material and filling the gaps in their knowledge. The first part of the article reviews the theory and the application of the Flipped Classroom approach by other authors in different subject areas. We present different taxonomic models and qualities that they build for the student's learning process. The following part analyses the application of the approach in the mentioned fields of study for students of Bachelor's and Master's degrees. In the article, we present steps for Flipped classrooms. We discuss also the key elements of The Flipped classroom and the benefits and limitations of using it. In conclusion, the article outlines the results achieved and the prospects for enhancing the engagement of the students in learning.

**Keywords:** E-learning; Flipped classroom approach; education strategy; university education.

### 1. INTRODUCTION

The traditional training approaches for students' preparation should be upgraded in order to engage students in the learning process. Once the distance learning is used, more emphasis should be placed on the electronic resources provided through different platforms and sources. The distance between teachers and students is increasing and interaction and cooperation are being implemented in a new way through Learning Management Systems. The Flipped classroom was constituted as an active, student-centered approach in order to raise classroom quality and engage students in the learning process [1].

Under digital technology, university students have access to a large amount of information, which they can use in their study. Some of them do so, following the instructions

of their lecturers, but others use less reliable sources, which are unfortunately often found on the web. This is one of the issues we encounter in preparing students for their classes.

The second problem that we want to solve is the presentation of information using the "pouring in the bank" approach, where students are not active in the learning process. Professors do not pose problems to solve during teaching and put students in the role of passive listeners.

We are using the Flipped classroom approach to the students' training to stimulate their activity in learning the material and filling the gaps in their knowledge. The article goals are to analyze the applied Flipped classroom approach.

## 2. THEORETICAL BACKGROUNDS

Flipped classroom approach has four different elements, known as 'Four Pillars of Flip' [1, 2].

- Flexible environment – space, mode of delivery and timelines for learning, often using VLE of the University;
- Learning culture – there is a transition from a teacher-centered approach to student-centered approach that encourages deep learning;
- Intentional content – to maximize the learning and to provide fluency and deepen students' cognitive understanding;
- Professional educator – who guides learning and continuously improves practice.

When explaining the Flipped classroom training model, we can look at the different taxonomic models that support the learning process and build qualities such as strategic thinking, insight, insistence, creativity and complex problem-solving, "perception of understanding" and "communication to understand" [3].

Accepted for classical and fundamental, Bloom's taxonomy does not reflect the pedagogical process flowing into the Flipped classroom. It (taxonomy) artificially separates the activities of individual domains: cognitive domain, affective domain, and psycho-motor domain. In the cognitive field, the structure itself is obscure at the level of psychic processes (perception, memory, thinking, etc.). According to Lahtinen [4], the hierarchical alignment of cognitive tasks in Bloom Taxonomy does not follow the trajectory of learning, does not reflect the development of the affective domain, and does not reflect some specific aspects such as problem-solving skills that are a key for the training of specialists for the 21st century.

In Bond's original taxonomy revised by L. Anderson, the names of the main categories of cognitive processes have been changed and action is indicated because thinking implies activity. The taxonomy includes categories of knowledge: factual, conceptual, and procedural/metacognitive [5]. It is the last category that reflects the main characteristic of the Flipped classroom - students learn, think, control and effectively use their own thought processes. The Flipped room is a pedagogical approach, where the conventional model of learning is inverted. The students become familiar with the learning topic before class, and in the classroom through discussion with peers and problem-solving activities assisted by teacher deep understanding can be achieved. This new taxonomy, after the evaluation stage, reaches a higher level – "create - creative activity", which is directly related to the essence of the activity in the Flipped classroom.

The conceptual model was proposed by Biggs and Collis [6] and called the Structure of the Observed Learning Outcomes (SOLO). SOLO-taxonomy contains a detailed classification of categories of cognitive activity. SOLO-taxonomy is mainly based on the processes of understanding, so knowledge passes through all levels of SOLO-taxonomy. In the SOLO

model, training assessment takes into account how learners learn and how lecturers develop learning processes to help learners use increasingly sophisticated cognitive processes.

Several approaches are applied to solve the problems we encounter that have been used by other authors in the academic circles to stimulate student activity not only in school hours but also to enhance their quest for learning through effective learning.

The Flipped classroom has increasingly become a core model of e-learning in 21st-century education. The pedagogy incorporates a group of learning strategies including blended learning, just-in-time teaching, and active learning. Contemporary educational research has consistently found that if students have the opportunity to preview key concepts ahead of class time, the face-to-face session can be more effectively used for active learning where concepts are analyzed and applied [7], [8].

Flipped classroom approach has been used in different disciplines for years. This is “a model in which students gain first-exposure learning prior to class and focus on the processing part of learning (synthesizing, analyzing, problem-solving, etc.) in class. To ensure that students do the preparation necessary for productive class time, Walvoord and Anderson propose an assignment-based model in which students produce work (writing, problems, etc.) prior to class. The students receive productive feedback through the processing activities that occur during class, reducing the need for the instructor to provide extensive written feedback on the students’ work.” [9].

“Flipping the classroom” means that students gain first exposure to new material outside of class, usually via reading or lecture videos, and then use class time to do the harder work of assimilating that knowledge, perhaps through problem-solving, discussion, or debates. In terms of Bloom’s revised taxonomy [10] this means that students are doing the lower levels of cognitive work (gaining knowledge and comprehension) outside of class, and focusing on the higher forms of cognitive work (application, analysis, synthesis, and/or evaluation) in class, where they have the support of their peers and instructor. This model contrasts the traditional model in which “first exposure” occurs via lecture in class, with students assimilating knowledge through homework; thus the term “Flipped classroom” (Figure 1).

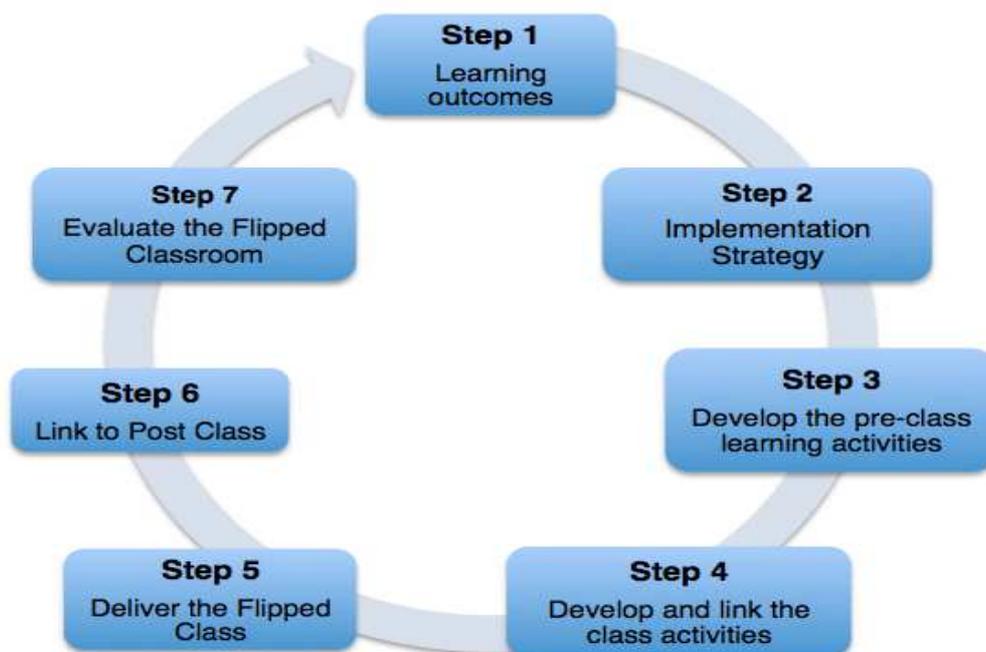


Figure 1. Seven Steps to Flipping the Classroom [7].

Karanicolas & Snelling [7] noted seven basic steps of implementing the Flipped classroom approach:

- Learning Outcomes;
- Implementation Strategy;
- Develop the pre-class learning activities;
- Develop and link the class activities;
- Deliver the Flipped Class;
- Link to Post Class;
- Evaluate the Flipped Classroom.

The application of this approach is embedded in the curriculum of the subjects "Programming and using the computers" and "Object-oriented programming". This includes both student assignments on a topic defined by the lecturer, which they present at the end of the semester and the assessment in the point system.

### 3. RESULTS AND DISCUSSION

Maureen Lage, Glenn Platt, and Michael Treglia described a similar approach as the inverted classroom and reported its application in an introductory economics course in 2000. Lage, Platt, and Treglia initiated their experiment in response to the observation that the traditional lecture format is incompatible with some learning styles. To make their course more compatible with their students' varied learning styles, they designed an inverted classroom in which they provided students with a variety of tools to gain first exposure to material outside of class: textbook readings, lecture videos, Powerpoint presentations with voice-over, and printable Powerpoint slides. To help ensure student preparation for class, students were expected to complete worksheets that were periodically but randomly collected and graded. Class time was then spent on activities that encouraged students to process and apply economic principles, ranging from minilectures in response to student questions to experiments to small group discussions of application problems. Both student and instructor response to the approach was positive, with instructors noting that students appeared more motivated than when the course was taught in a traditional format. [11].

The key elements of the Flipped classroom are as follows [9]:

- It provides an opportunity for students to gain first exposure prior to class.
- It provides an incentive for students to prepare for class.
- It provides a mechanism to assess student understanding.
- It provides in-class activities that focus on higher level cognitive activities.

The analysis of our experience is based on the training in the subjects "Programming and using the computers", "Food contaminants", and "Object-oriented programming" focusing on these four key elements of the approach. We apply in parallel both pedagogical approaches: traditional classroom with face-to-face lectures alongside Flipped classroom. The materials for learning activities are situated mainly in the virtual learning environment of Trakia University – Stara Zagora (<http://edu.uni-sz.bg/>), but students also receive useful links to different resources.

#### 3.1 Providing an opportunity for students to gain first exposure prior to class.

To get prepared for the first exposure before the class, students complete the pre-class reading assignment. Students choose a subtopic from the topic of the next occupation for which they should prepare a presentation or an exposition based on the recommended materials from lecturers and other relevant reliable sources. The results of our experience

showed that approximately half of the students prefer new approaches as for example short time video material, hot reportage or theoretically well-grounded movies that cover the topic. After such a presentation they actively participated in the discussion. Of course, they always have to be aware which sources of information are most reliable. These are textbooks, teaching materials from universities, journal scientific articles and scientific conferences, hardware and software themes to compare and analyze the features of the items under consideration. Another form of extra classroom activities is an assignment that every student has to prepare and upload for evaluation in the virtual learning environment of Trakia University – Stara Zagora. It is compulsory for the previously mentioned subjects of study.

### **3.2 Providing an incentive for students to prepare for class.**

The assignments we assign to students may vary and the choice is up to the students themselves. It is important that students be prepared, and the task for trainers, in this case, is to stimulate them. The point score system that is applied allows students who participate in the assignment to receive additional bonus points, which are taken into account when the final mark is established. This is the incentive that encourages students to be prepared more to compensate for missing points or to increase their balance for the final score. Participation without evaluation is not stimulating. In addition, both the quality of the prepared content assignment and its presentation and the interest it generates among other students in the group are assessed.

### **3.3 Providing a mechanism to assess student understanding.**

During the presentation of pre-class reading assignment a discussion arises, which aims to clarify the questions coming from the presentation. In addition, the lecturer gives the basic knowledge of the problem in advance. This mechanism for understanding the material is complemented by the accumulated experience of the teaching staff of previous years that allows to focus attention and to set up topics that have hindered the students in their perception. It is, of course, possible to make a preliminary test as a starting point for these students' projects.

At the Faculty of Techniques and Technologies, the student's test results of previous academic years are evaluated. From that examination, the problematic topics and subtopics for the students can be defined. Teachers plan the specific areas and themes that will be discussed from the beginning of the current year and they are assigned to students as extra-curricular tasks.

### **3.4 Providing in-class activities that focus on higher level cognitive activities.**

The pre-class reading assignment allows the students to enhance their knowledge, because of some circumstances. First, they have received basic knowledge from the taught courses at school. Secondly, they are prepared on the given subtopic by expanding their knowledge. Third, they have a discussion that stimulated their thinking and is conducted under the competence of the guiding teacher. In other contexts, students may spend time in class engaged in debates, data analysis, or synthesis activities. They mainly use class time to deepen the understanding and to increase self-confidence by applying their knowledge [9]. For the subject "Object-oriented programming" students have to solve programming tasks by creating programming code and demonstrating the end result in Program Language Java. This is an assignment for all students and this is a creative task that requires a lot of effort, knowledge, and preparation by the students. In the program "Food contaminants" students present their topic for discussion to the other participants in the class for which they are

prepared and guide that discussion. We also use flipping the tutorial, by providing a video to watch before the tutorial and using classroom time for discussion and problem-solving activities. The same tactic has been used in the University of Manchester's Schools of Social Sciences, UK, and they recorded a general improvement in student engagement [12].

An effective Flipped classroom is one in which the time normally spent lecturing is used for in-class activities, discussions, problems, and group projects. The most meaningful learning in a Flipped classroom occurs as a result of the efficient use of the extra class time [13].

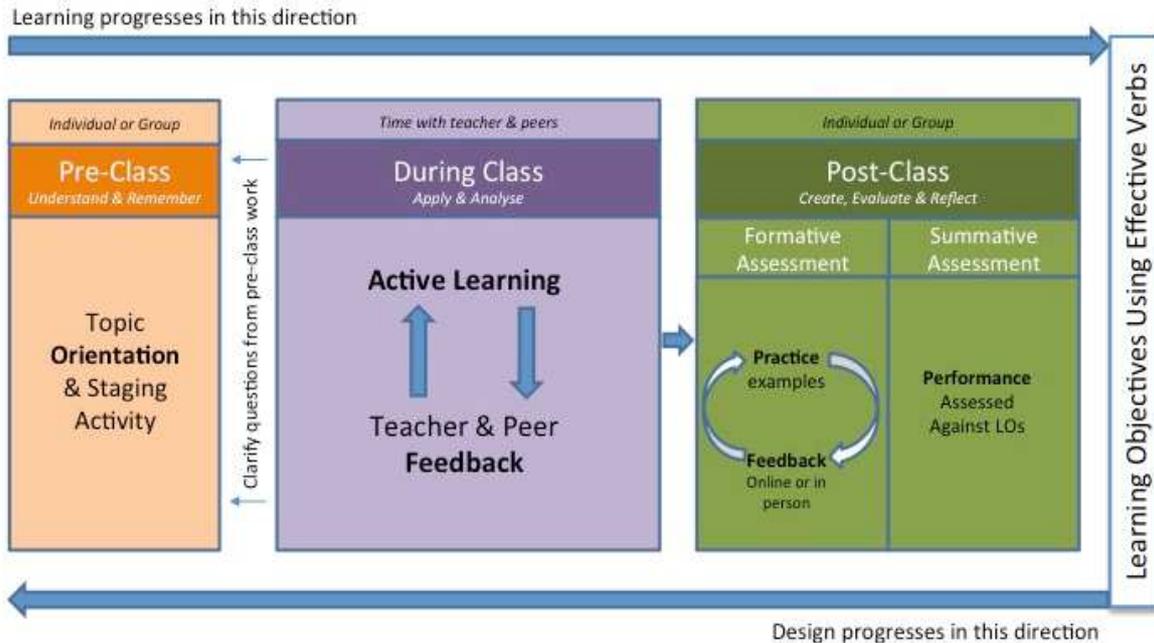


Figure 2. Flipped Classroom Design in Practice Aligned with Bloom's Modified Taxonomy [14]

The Flipped Learning Network's description provides a broader perspective on what is encompassed in a flipped learning design (Figure 2). It suggests that in order for the model to offer enhanced opportunities for deeper, more active, and engaged learning, the process of flipping has to be well thought out, intentional and holistic. This definition of flipped learning expands on the basic idea of the Flipped classroom's inversion of the teaching and learning dynamics, emphasizing that the opportunities for interaction in the 'group learning space' are utilized and not taken up with 'direct instruction' [15].

The major design principles of this flipped instructional approach were: self- and co-regulated, recorded small-group discussions without the presence of the instructor; flipped role of the instructor and students; and the use of video-chat technology, video camera, and Dropbox, to enable learning. This particular instructor experimented with radical student-directed learning with the instructor absent. Students were given prompts and role-playing scenarios that guided the small-group discussions, which students then had to edit and record for the instructor [15].

The mentioned benefits of using a Flipped classroom are:

- increased interaction between lecturers and students;
- teachers can more clearly understand how deeply the students understand the learning material;
- there is an opportunity for better individual engagement between teachers and students;

- students who hesitate to ask questions during lectures can now do so during the discussions and their colleagues' presentations;
- in the preliminary preparation of materials outside the classroom, students can get acquainted with their lectures and, if necessary, formulate their questions before the class;
- the approach creates prerequisites for greater student responsibility for their learning experience.

Teachers should include clear expectations for self-direction and motivation within the syllabus of the discipline. “For this reason, verification, through the application of the information in a project-based scenario, maybe one indication that students have performed the task of viewing the lecture prior to entering the classroom” [18].

Limitations of using the Flipped classroom model:

- Not applicable to all subjects. There are studies that prove this claim;
- This approach often applies to group learning activities that do not appeal to all students, especially those who are adapted to working independently;
- It is often necessary to process the already prepared training materials such as online lectures and audio recordings to comply with the requirements of the Flipped classroom approach.

“In order to effectively implement a Flipped classroom, teachers must possess a set of requisite technical skills, conceptual knowledge and pedagogical expertise”[18]. Implementation of any new strategy requires an alteration in the minds of both educators and students. There is already existing evidence that flipped learning causes measurable improvements of students' and teachers' motivation, as for example increased class attendance, better grades, and etc. [16]. Teachers must be willing to experiment with the alternative and new strategies in the classroom and to apply these new approaches, which reflect on their teaching effectiveness [17].

The effective application of vital competencies such as critical thinking, creativity, communication, and collaboration [19] at one's workplace is more likely if these skills are acquired in college. In addition, one's adaptability to new technologies is crucial for graduate students to succeed in the workplace. This underlines the need for the provision of technology-infused learning environments at educational institutions. Training must be provided for educators in the application of existing and emerging technologies [17].

#### **4. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH**

In the article we discussed some main definitions of the Flipped classroom approach, models for education with that method, and the key elements of its application in Faculty of Technics & Technology – Yambol.

The practices showed that for the full implementation of this approach, the FTT – Yambol has to accept a new strategy for the education, perhaps without lectures, for example through application of a project-based scenario.

However, for the full implementation of this approach we need at least several semesters in order to adjust curricula, to design teaching materials according to the requirements of the approach in classes for some suitable topics. Beyond any doubt, blended learning is very suitable and supportive for the Flipped classroom approach and the implementation of that methodology really increases students' motivation to study and attend academic activities.

## ACKNOWLEDGMENT

This publication is supported by a university project № 03FTT/30.05.2016; Theme: Contactless methods for assessing basic quality indicators of dairy products (Trakia University, Faculty of Technics and Technologies – Yambol).

## REFERENCES (TRANSLATED AND TRANSLITERATED)

- [1] Ozomatli, F. & Asiksoy, G., Flipped classroom approach. World Journal on Educational Technology: Current Issues.8 (2), 98-105, 2016. (in English)
- [2] Flipped Learning Network (FLN). [Online]. Available: <https://flippedlearning.org/site/Default.aspx?PageID=92> The Four Pillars of F-L-I-P™. 3/5/2015, 2014. (in English)
- [3] J.B. Biggs, Teaching for quality learning at University, This First edition, Open University Press, Buckingham, UK, 1999. (in English)
- [4] E. A. Lahtinen, Categorization of Novice Programmers: A Cluster Analysis Study. Proceedings of the 19th annual Workshop of the Psychology of Programming Interest Group, Joensuu, Finland, July 2-6, 2007. (in English)
- [5] D. R. Krathwohl, "A Revision of Bloom's Taxonomy: An Overview." Theory into Practice, 41 (4): pp. 212-18, 2002. (in English)
- [6] J. B. Biggs, and K. Collis, Evaluating the Quality of Learning: the SOLO taxonomy. New York, Academic Press, 1982. (in English)
- [7] S. Karanicolas, C. Snelling, Making the transition: achieving content connectivity and student engagement through flexible learning tools. In Proceedings of the Distance Education Association of New Zealand (DEANZ) Conference Wellington, 2010. (in English)
- [8] A.K. Ellis, Research on educational innovations, Publisher: Routledge, London, UK, 2014. (in English)
- [9] C. Brame, Flipping the classroom. Vanderbilt University Center for Teaching. [Online]. Available: <http://cft.vanderbilt.edu/guides-sub-pages/flipping-the-classroom/>, 2013. Accessed on: 12-Dec-2018. (in English)
- [10] L.W Anderson. and Krathwohl D., A taxonomy for learning, teaching, and assessing: a revision of Bloom's taxonomy of educational objectives. Longman, New York, USA, 2001. (in English)
- [11] M.J. Lage, G.J. Platt, M. Treglia, Inverting the classroom: A gateway to creating an inclusive learning environment. The Journal of Economic Education. 2000 Jan 1;31(1): pp.30-43, 2000. (in English)
- [12] University of Manchester, 2015. Flipping the Classroom. [Online]. Available: <http://www.elearning.eps.manchester.ac.uk/blog/2014/flip/>. Accessed on: 1 May 2015. (in English)
- [13] R. Szparagowski, The effectiveness of the flipped classroom. [Online]. Available: <https://scholarworks.bgsu.edu/cgi/viewcontent.cgi?article=1118&context=honorsprojects>, 2014. Accessed on: 12.Jan.2018. (in English)
- [14] S. Karanicolas, C. Snelling, A. Kemp. The University of Adelaide Flipped Learning Community of Practice. The Flipped Classroom Explained. [Online]. Available: <https://www.adelaide.edu.au/flipped-classroom/about/>. Accessed on: 12.Jan.2019. (in English)
- [15] M. Jenkins, R. Bokosmaty, M. Brown, C. Browne, Q. Gao, J. Hanson, and K. Kupatadze, K., Enhancing the design and analysis of flipped learning strategies. Teaching & Learning Inquiry, 5(1), pp.1-12, 2017. (in English)
- [16] Hamdan, N., McKnight, P., McKnight, K. and Arfstrom, K. (2013) A Review of Flipped Learning. [Online]. Available: [http://www.flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/LitReview\\_FlippedLearning.pdf](http://www.flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/LitReview_FlippedLearning.pdf). Accessed on: 1 May 2015. (in English)
- [17] A. Roehl, S.L. Reddy, G.L. Shannon, The flipped classroom: An opportunity to engage millennial students through active learning strategies. Journal of Family & Consumer Sciences. 2013 Mar;105(2): pp.44-49. 2013. (in English)
- [18] D. Shimamoto, Implementing a flipped classroom: An instructional module. 17th Annual TCC Worldwide Online Conference, April 17-19, 2012, Hawaii, USA, 2012. (in English)
- [19] N. Blair, Technology integration for the new 2P' century learner. Principal, January/February) pp. 8-13, 2012. (in English)

*Text of the article was accepted by Editorial Team 24.03.2019*

## ЗМІШАНЕ НАВЧАННЯ СТУДЕНТІВ ЗА МОДЕЛЮ ПЕРЕВЕРНУТОГО КЛАСУ

### **Веселіна Недєва**

PhD з інформатики, доцент  
Тракийський університет, факультет техніки та технологій,  
кафедра електротехніки, електроніки та автоматики, м. Ямбол, Болгарія  
ID ORCID 0000-0002-4082-1896  
*veselina.nedeva@trakia-uni.bg*

### **Сніжана Дінева**

PhD з біологічних наук, доцент  
Тракийський університет, факультет техніки і технологій, кафедра технологій харчування  
м. Ямбол, Болгарія, ID ORCID 0000-0002-4655-6640  
*sbdineva@abv.bg*

### **Златоелі Дучева**

PhD з педагогіки, доцент  
Тракийський університет, факультет техніки та технологій,  
кафедра електротехніки, електроніки та автоматики, м. Ямбол, Болгарія  
ID ORCID 0000-0002-1809-467X  
*zl.ducheva@abv.bg*

**Анотація.** У статті представлено використання методу перевернутого класу на факультеті техніки й технологій (ФТТ) – Ямбол під час вивчення дисциплін "Програмування та використання комп'ютерів", "Забруднювачі харчових продуктів" та "Об'єктно-орієнтоване програмування" у 2016-2018 навчальних роках. У студентів виникає проблема з фільтрацією деяких ненадійних джерел. У новому цифровому світі викладачі очікують від студентів креативної підготовки до своєї майбутньої професійної діяльності з використанням нових підходів. Якщо студенти прислухаються до порад викладачів стосовно рекомендованої літератури та ресурсів, проведення їх проектів стає значно успішнішим. Це одна з проблем, з якою ми стикаємось під час підготовки студентів до занять. Другою проблемою, яку ми хочемо вирішити, є представлення інформації з використанням підходу «вливання в банк», коли студентам пропонуються лекції та навчальні матеріали, але вони не мають можливості брати активну участь у навчальному процесі. Вирішуючи проблеми й знаходячи нові рішення, студенти навчаються набувати знання без прив'язки до одного місця. Мета статті – проаналізувати підхід, який ми застосовуємо у навчанні студентів, щоб стимулювати їх до вивчення матеріалу та заповненню прогалів у знаннях. У першій частині статті розглядаються теорія та застосування підходу перевернутого класу в різних предметних галузях, які описані іншими авторами. Ми представляємо різні таксономічні моделі та якості, створені для навчального процесу студента. Далі аналізується застосування підходу в зазначених галузях навчання для студентів бакалаврських та магістерських ступенів. У статті розглянуто етапи впровадження методу перевернутого класу, а також ключові елементи і переваги та обмеження з використанням такого методу. У висновках зазначено результати дослідження, а також перспективи подальшої мотивації студентів до навчання завдяки використанню методу перевернутого класу.

**Ключові слова:** електронне навчання; метод перевернутого класу; стратегія навчання; університетська освіта.

## СМЕШАННОЕ ОБУЧЕНИЕ СТУДЕНТОВ ПО МОДЕЛИ ПЕРЕВЕРНУТОГО КЛАССА

### **Веселина Недєва**

PhD по информатике, доцент  
Тракийський університет, факультет техніки и технологій,  
кафедра електротехніки, електроніки и автоматики, г. Ямбол, Болгарія  
ID ORCID 0000-0002-4082-1896  
*veselina.nedeva@trakia-uni.bg*

**Снежана Динев**

PhD по биологическим наукам, доцент  
Тракийский университет, факультет техники и технологий,  
кафедра технологий питания, г. Ямбол, Болгария  
ID ORCID 0000-0002-4655-6640  
*sbdineva@abv.bg*

**Златоели Дучева**

PhD по педагогике, доцент  
Тракийский университет, факультет техники и технологий,  
кафедра электротехники, электроники и автоматике, г. Ямбол, Болгария  
ID ORCID 0000-0002-1809-467X  
*zl.ducheva@abv.bg*

**Аннотация.** В статье представлено использование метода перевернутого класса на факультете техники и технологий (ФТТ) – Ямбол во время обучения дисциплинам "Программирование и использование компьютеров", "Загрязнители пищевых продуктов" и "Объектно-ориентированное программирование" в 2016-2018 учебных годах. Для студентов возникает проблема с фильтрацией некоторых ненадежных источников. В новом цифровом мире преподаватели ожидают от студентов креативной подготовки к своей будущей профессиональной деятельности с использованием новых подходов. Если студенты прислушиваются к советам своих преподавателей относительно рекомендуемой литературы и ресурсов, проведения их проектов становится значительно успешнее. Это одна из проблем, с которой мы сталкиваемся при подготовке студентов к занятиям. Второй проблемой, которую мы хотим решить, является предоставление информации с использованием подхода «вливания в банк», когда студентам предлагаются лекции и учебные материалы, но они не имеют возможности принимать активное участие в учебном процессе. Студенты обучаются приобретать знания без привязки к одному месту, решая проблемы и находя новые решения. Цель статьи – проанализировать подход, который мы применяем к обучению студентов, чтобы стимулировать их к изучению материала и заполнению пробелов в знаниях. В первой части статьи рассматриваются теория и применение подхода перевернутого класса в различных предметных областях, которые описаны другими авторами. Мы представляем различные таксономические модели и качества, предназначенных для учебного процесса студента. Далее анализируется применение подхода в указанных отраслях обучения для студентов бакалаврских и магистерских степеней. В статье рассматриваются этапы внедрения метода перевернутого класса, а также обсуждаются ключевые элементы и преимущества и ограничения по использованию такого метода. В выводах указываются результаты исследования, а также перспективы дальнейшей мотивации студентов к обучению благодаря использованию метода перевернутого класса.

**Ключевые слова:** электронное обучение; метод перевернутого класса; стратегия обучения; университетское образование.

