UDC 81`362; IRSTI 14.35.07
https://doi.org/10.47526/habarshy.vi2.598

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STRUCTURE AND PECULIARITIES OF THE CHALLENGE BASED LEARNING APPROACH

Abstract. Today's students are presented with content-centric assignments that meet standards but lack a real-world context and opportunities for active participation. Because these assignments often fail to engage students, they can lead to uninspired work and a gradual process of disengagement. To address this need, Apple Inc. worked with teachers and leaders in the education community to develop a new approach to teaching and learning called Challenge Based Learning. Challenge-based learning (CBL) is a pedagogic approach for K12 education pioneered by education staff at Apple, Inc. that has its roots in problem-based learning and the work of John Dewey. The approach focuses on increasing student engagement. Unlike problem-based learning, CBL is a collaborative learning experience in which teachers and students work together to learn about compelling issues, propose solutions to real problems, and take action. The approach asks students to reflect on their learning and the impact of their actions, and publish their solutions to a worldwide audience. This article discusses the formation and characteristics of the Challenge Based Learning approach.

Keywords: Challenge Based Learning approach, teaching environment, collaborative learning experience, assessment strategies, development of the 21st century skills.

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«Мәселеге негізделіп оқыту» тәсілінің құрылымы мен ерекшеліктері

Аңдатпа. Қазіргі студенттерге стандарттарға сәйкес келетін, бірақ нақты контекст пен белсенді қатысу мүмкіндігі жоқ мазмұнға бағытталған тапсырмалар ұсынылады. Бұл тапсырмалар көбінесе студенттерді қызықтыра алмайтындықтан, олар шабыттанбаған жұмысқа және біртіндеп ажырату процесіне әкелуі мүмкін. Осы қажеттілікті шешу үшін Apple Inc. мұғалімдермен және білім беру қоғамдастық көшбасшыларымен бірлесіп оқыту мен оқудағы Challenge Based Learning деп аталатын жаңа тәсілді әзірледі. Мәселеге негізделіп оқыту (Challenge-based learning (CBL)) – бұл Apple, Inc компаниясының білім беру

**** Бізге дұрыс сілтеме жасаңыз:***
Akeshova M.M., Aripzhan G.Zh. Structure and Peculiarities of the Challenge Based Learning Approach // *Ясауи университетінің хабаршысы*. – 2021. – №1 (119). – Б. 160–172. https://doi.org/10.47526/habarshy.vi2.598
****Cite us correctly:***
Akeshova M.M., Aripzhan G.Zh. Structure and Peculiarities of the Challenge Based Learning Approach // *Iasaui universitetinin habarshysy*. – 2021. – №2 (120). – B. 160–172. https://doi.org/10.47526/habarshy.vi2.598

ISSN-p 2306-7365
ISSN-e 2664-0686

қызметкерлері бастамашылық еткен K12 білім беруіне арналған педагогикалық тәсіл, оның тамыры проблемалық оқыту мен Джон Дьюидің жұмыстарынан бастау алады. Бұл тәсіл оқушылардың белсенділігін арттыруға бағытталған. Проблемалық оқытудан айырмашылығы, мәселеге негізделіп оқыту – бұл бірлескен оқыту тәжірибесі, мұнда мұғалімдер мен оқушылар бірлесіп, қызықтыратын мәселелерді білуге, нақты мәселелердің ұтымды шешімдерін ұсынуға және іс-әрекетке көшеді. Аталмыш тәсіл студенттерден олардың оқуы мен іс-әрекеттерінің әсері туралы ойлануды және олардың шешімдерін дүниежүзілік аудиторияға жариялауды сұрайды. Бұл мақалада «Мәселеге негізделіп оқыту» тәсілінің қалыптасуы, құрылымы мен ерекшеліктері талқыланады.

Кілт сөздер: мәселеге негізделіп оқыту тәсілі, оқыту ортасы, бірлескен оқу тәжірибесі, бағалау стратегиясы, XXI ғасыр дағдыларын дамыту.

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Структура и особенности подхода к обучению, основанного на задачах

Аннотация. Сегодняшним студентам предлагаются контент-ориентированные задания, соответствующие стандартам, но лишенные реального контекста и возможностей для активного участия. Поскольку эти задания часто не привлекают студентов, они могут привести к скучной работе и постепенному процессу отстранения. Чтобы удовлетворить эту потребность, Apple Inc. вместе с учителями и лидерами образовательного сообщества разработала новый подход к преподаванию и обучению под названием «Обучение на основе вызовов». Основанное на задачах обучение (CBL) – это педагогический подход к обучению K12, впервые примененный педагогическим персоналом Apple, Inc., который берет свое начало в проблемно-ориентированном обучении и работах Джона Дьюи. Подход направлен на повышение вовлеченности студентов. В отличие от проблемно-ориентированного обучения, CBL – это совместный учебный процесс, в котором учителя и ученики работают вместе, чтобы узнать о насущных проблемах, предложить решения реальных проблем и принять меры. Подход предлагает студентам задуматься над своим обучением и воздействием своих действий и опубликовать свои решения для мировой аудитории. В этой статье обсуждается формирование и характеристики подхода к обучению, основанному на задачах.

Ключевые слова: подход к обучению, основанному на задачах, среда обучения, опыт совместного обучения, стратегии оценивания, развитие навыков 21 века.

Introduction

Challenge Based Learning is a collaborative learning experience in which teachers and students, schoolteachers and students work together to learn about problems, challenges, and make suggestions and actions to solve specific problems. This approach encourages students to deal with challenges based on their knowledge, to communicate to the world audience the effects of their actions in dealing with those challenges and the decisions they have made to address those challenges. Before touching upon its formation, let us define the meaning of the word “challenge”. The word “challenge” has several meanings in English. It has a number of translations as “challenge”, “problem”, “difficulty”, “difficult problem”.

Webster's New International English Dictionary considers the etymology of the word challenge and offers the following definition: 1. Requirement for identification, 2. Invitation to

solve a problem, 3. Invitation to a duel, competition. 4. A complex issue that calls for special efforts and perseverance [1].

In the Longman Dictionary of Contemporary English, the word “challenge” is defined as follows: 1. an invitation to participate in a competition; 2. Competition, 3. A difficult issue [2]. Oxford Advanced Learner's English Dictionary defines the word “challenge” as a new or challenging task that tests a person's (someone's) abilities. 2. A challenge or suggestion to a competition or fight [3]. Oxford Thesaurus English vocabulary defines the word as “1. A question, a dispute, doubt, 2. An invitation, coercion, call, provocation, contradiction, objection; ultimatum, 3. problem, demand, motivation, test” [4]. In Mueller's English-Russian dictionary, the word “challenge” has a number of definitions, such as 1. challenge (competition, duel, etc.), 2. A difficult task, a problem [5].

In general, the word "challenge" means a challenge, an invitation to a problem, a competition, a challenge to find a solution to a difficult problem. However, the meaning of the word “challenge” is very different from the meaning of the word problem. It is based on force.

The world's favorite Online Dictionary.com defines the word “challenge” as follows:

• an invitation to participate in any competition and contest.

• an invitation by nature or character to a battle, competition, special effort, etc.

Challenge based learning (CBL) which was formed on the basis of the word “challenge” is a basis of teaching through the real-life conflict resolution. This approach encourages all participants (students, teachers, families and community members) to identify great ideas, ask good questions, solve problems, gain in-depth thematic knowledge, develop 21st century skills and share their thoughts with the world [6].

Methods

It is impossible to be a competitive specialist without mastering the advanced technologies of teaching in the field of modern education. Mastering new technologies has a positive effect on the intellectual, professional, moral, spiritual and many other aspects of a teacher's personality, helps him to develop himself and effectively organize the educational process. Challenge based learning, one of the most advanced learning technologies, is of great importance in the formation of students' knowledge and skills necessary to cope with various social challenges in real life [7]. Challenge based learning approach shares many of the purpose of the service, based on the foundation of practical education and the wisdom of the long history of progressive education. Although many students are not experts in their field, this approach develops not only knowledge of the topic, memorization of facts and basic skills, but also the ability to combine this knowledge with real-life problems. [8]. This methodological approach is fully aware of the innovative ideas of education, media, technology, entertainment, leisure, the workplace and society.

Challenge based learning system was developed on the basis of the Apple Classrooms of Tomorrow – Today (ACOT2) project, which began in 2008 to define important design principles for the 21st century teaching environment. Starting with the design principles of EBAS2, Apple Inc. Corporation has worked with exemplary teachers to develop, test and implement challenge -based learning [9].

The use of difficulties and problems in the formation of learning experiences stems from the study of reality television, conversations with people and individuals whose lives are mostly difficult, and the presentation of individual learning experiences in and out of the classroom. When faced with a “challenge”, groups and individuals gain experience, gain internal and external resources, make plans and try to find the best solution [10]. Failure in this learning experience is the result of successful research activities.

The original structure of the challenge based learning approach was documented in 2008 on white paper and was published in the Apple Inc. Corporation. Since then, teachers and schools around the world have adopted this teaching method to improve teaching and learning, allowing

ISSN-p 2306-7365
ISSN-e 2664-0686

them to quickly make differences and distinctions in their environment and community. In 2009, the New Media Consortium published an in-depth study of teaching based on challenge to classroom practice. Based on this approach, the study, which covered 6 schools, 29 teachers and 330 students in 17 subjects in the United States, was particularly successful for 9th graders [11].

In 2011, an additional study was conducted to provide a more in-depth study of the K-20 audience and the development of 21st century skills. The study included 19 schools, 90 teachers and 1,500 students from three countries. Research shows that challenge based learning is the only effective way to engage students, meet curriculum standards and develop 21st century skills. The study concluded that challenge based learning can be applied to learners of all ages [12].

The updated structure is divided into three stages:

• Research - All learners plan to participate in trips that form the basis of decision-making and solving academic performance.

• Action - Evidence-based decisions are developed and implemented by an authentic audience and evaluated based on the results (Figure 1) [13].

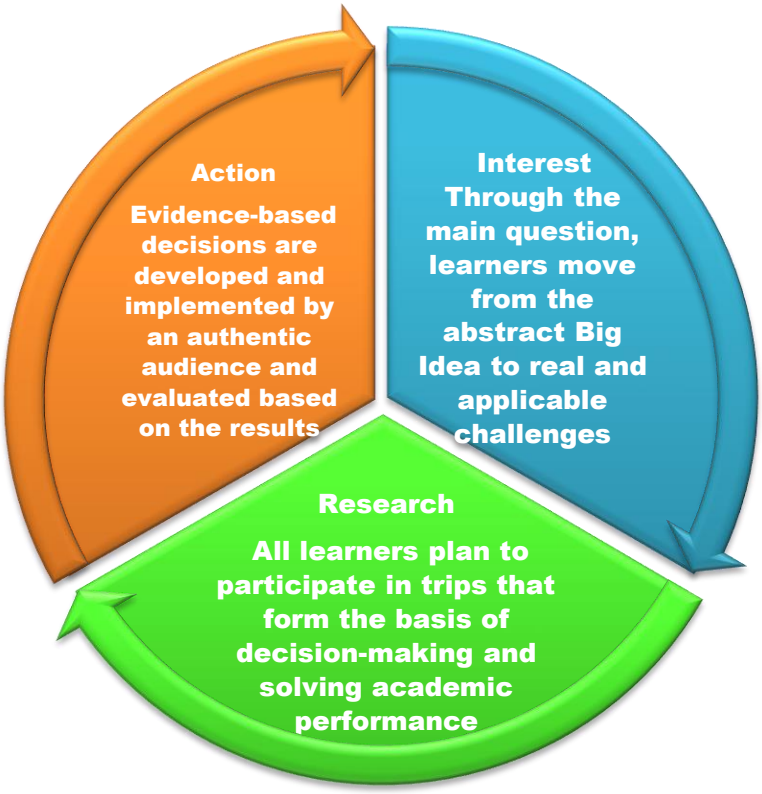

Figure 1. The structure of the challenge based learning approach

During the process, all participants document the experience, demonstrate it in practice and share it with the world. The interdisciplinary, cooperative and applied nature of challenge based learning makes it ideal for students of all ages. This teaching method is designed for educators from primary school to higher education who want to implement a teaching method based on the difficulties in the learning environment. The structure of the challenge-based learning approach is extended to new areas, such as strategic planning, on-the-job training, as well as the development and operation of mobile software [14]. The principles of challenge-based learning are given in Table 1:

Table 1 – Basic principles of challenge-based learning

	Basic principles of challenge-based learning
1	A flexible framework of knowledge that can be implemented as a leading pedagogy or combined with other progressive teaching methods
2	A small model with many entry points and the ability to form a large world from small
3	Free and open system without individual ideas, products or subscriptions
4	It is a process that increases the responsibility of all students to learn
5	Creating a realistic environment that meets academic standards and has a deep connection with the content
6	Focus on global ideas, important issues and solutions for local and age groups
7	Development of the XXI century skills
8	Targeted use of technology for research, analysis, organization, collaboration, networking, communication, publication and demonstration.
9	Provision of students with the opportunity to make a difference now.
10	Creating an environment that has a profound impact on the learning and teaching process
11	Methods of documenting and evaluating the learning process and products [15]

It is based on a set of ideas that form the basis of the challenge based learning approach. Familiarity with these concepts provides an in-depth understanding of the structure, discussion opportunities and support for implementation. The founders of challenge -based learning theory believe that the function of thinking in learning is not only to acquire new knowledge, but also to learn new ways to achieve that goal. According to A.M. Matyushkin, “the main function of thinking in teaching is that it allows to acquire new knowledge and act in a new way. All systems of knowledge and actions in human life are the result of his thinking ability. Man's knowledge is a manifestation of his thinking, that is, the main means of his cognition "[16].

Vygotsky's socio-cultural theory emphasizes the importance of social interaction and the use of artifacts for learning. Three principles are proposed for the design of the educational environment, derived from the works of Vygotsky: First, the concept of real action is to propose to model the actions and tools derived from professional experience. Second, "construction" allows students to create and share artifacts in society. Third, the educational environment should be designed to ensure close collaboration between students and their peers, as well as students and experts [17].

In connection with these principles, several educational scenarios have been developed within the COLDEX project. The main pedagogical approach is Challenge Based Learning (CBL). It can be described as extended problem-based learning, but it includes some components of experience, project-based, and solution-based learning perspectives. Project-based and problem-based activities are usually focused on a traffic issue or problem [18]. In challenge-based learning, the problem is replaced by a n invitation to fight against challenge.

Tasks to be solved or "challenges" may include ways to solve problems related to scientific phenomena, approaches to their development, design and implementation. Important learning activities that are relevant to challenge-based learning require students to think about a number of possible solutions using a variety of interactive tools, offering challenging scenarios. Such activities mobilize students around important issues and are effective in facilitating small group collaboration. In terms of collaboration, the need for this is not artificially imposed on the student community by the system, but is based on the nature of the task. If collaboration is only needed to complete a task, students can appreciate the importance of collaborative activities, such as sharing information,

ISSN-p 2306-7365
ISSN-e 2664-0686

discussing partial research findings, and working with collaborative solutions and synthetic solutions.

When using challenge-based learning, creating a vocabulary appropriate to the environment in which the challenge is being considered is critical to all plans and to the success plans. If there are language disagreements before starting a challenge-solving study, the final results will be unsatisfactory.

In the process of "challenge-based learning" each participantis a learner: Teacher / Student and Student / Teacher – all opportunities to access information allow to break the traditional hierarchical structure of learning environments. In this new paradigm, all stakeholders will be teachers, educators, students and pupils. Students (pupils, teachers, administrators, families, and community members) actively share responsibility and accountability for creating and participating in learning experiences. When the challenge-based approach is used in the learning process, the role of teachers, educators and other adults in the school does not diminish, as they are responsible for successful learning practices. It attracts students to all stages of the process by easing all the burden of all work. Thus, they will continue to participate in each stage of the process. Students continue to study, but they share the responsibility for solving the challenge, meeting the standards, and mastering the resources and training with those who are directly involved.

When considering new ideas for challenge-based learning, the teacher should develop a common vocabulary that should consider the institutional language between students and all stakeholders. Common understanding is essential for successful solutions. The best teachers and students need time and support to adapt to new roles. This is because in previous years they played traditional roles. That is, she/he taught traditional lessons as a teacher and a student, a teacher and a student. Successful challenge-based learning programs provide reliability and support.

The main feature of challenge-based learning is that there are contradictions between what the student knows and does not know, and because there is no ready approach to solving the problem, a problem situation arises, which increases the student's search activity and motivation. So, to think is to learn to see the dialectical contradictions, and thus to recognize the real truth. Contradictory thinking is the driving force of development. Challenge-based learning can cause different levels of difficulties/challenges for the teacher, depending on what and how many actions he should take to solve the challenge [19].

Challenge-based learning can be seen as a way to "move beyond the four walls of the classroom". That is, the involvement of all members of the community in this learning process expands resources, creates opportunities for authentic education, and the responsibility for education rests solely with the community, which is larger than teachers and educators.

Important connections are made between the content of education and the lives of students, as a result of which the student is especially encouraged. The more students are interested in the content of knowledge, the deeper their knowledge.

Challenges and problems used in challenge-based learning are situations or activities that give students a sense of urgency and reinforce actions.

The practice of challenge-based learning in education helps to form meaningful knowledge and organically develop students' skills in the 21st century.

The challenge -based learning approach allows all students to think creatively, experiment with new ideas, get feedback and try again. All stages of this approach include hierarchical capabilities.

In the challenge-based learning approach, technology is used to research, communicate, organize, create and present information. The use of technology allows students to guide and restructure their learning experiences.

Finding a solution to a problem is one of the most valuable aspects of challenge-based learning. There is an opportunity to evaluate processes and products during challenge -based learning practices.

At each stage of the challenge -based learning process, students document and publish using text, video, audio and images. These artifacts are useful for regular displays, informative assessments, teaching evidence, portfolios and conversations about their own conflicts.

Challenges motivate actions and acting urgently. In challenge -based learning, problems / challenges involve a specific structure (engaging, exploring, and acting), vary in duration and intensity, and can be adapted to many learning environments. In their CBL Guide, Mark Nichols and Karen Kator identify three types of challenge that can be encountered with this approach in general (Table 2):

Table 2 – Types of challenge in the research of Mark Nichols and Karen Kator

1	Nano Challenges are short-term, teacher-oriented issues that focus on the formation and development of a specific knowledge content or skill. Students usually start solving a problem directly without identifying a Big Idea or an Essential Question. This process involves stages of research and action (Investigation and Act phases), but is carried out at a much lower level of intensity and ceases to be carried out with an external audience. Nano problems often lead to important tasks or long-term difficulties in solving certain concepts.
2	Mini Challenges expand boundaries and provide students with a higher level of choice and responsibility. These questions, which last 2-4 weeks, allow students to start with a great idea and work on all the basics. The depth of research and the expansion of solutions will increase, and the focus may be on specific educational content or multidisciplinary knowledge. Given the "show what you can do" perspective, Sub-Challenges are useful for an intensive learning experience designed to prepare you for long-term challenges.
3	Standard Challenges take longer (a month or more) and allow students to find a solution in a much longer period of time. Together, students identify, research and develop great ideas, conduct extensive research in many disciplines and take full responsibility for the completion of the process.
4	Capstone Challenges – Standard questions used as the highest academic and intellectual experience for students. These include one-year class-level problems or large projects that are implemented as a "thesis" for graduation.
5	Strategic Challenges are designed for planning at the institutional level. Any organization can use the structure of this approach to define the mission, identify challenges, develop a common language and develop strategic plans. Great ideas like time, achievement, learning, technology and school culture are great for starting deep and important conversations. The rationale for strategic issues is adapted to meet the needs of the context [20].

The challenge-based learning program provides participants with the necessary framework for building skills in the 21st century, building a lifelong learning framework, and implementing measures that have a direct impact on the world. If we imagine that millions of educated students are focused on making solutions to their local and global challenges as part of their school work, the world will be a better place. Therefore, the participants of the challenge-based learning program, by working together, make a difference, contribute to the solution of problems of global importance.

Challenge-based learning encourages students to learn more about the subjects they are studying, to identify and solve problems, and to make a difference in their communities and share their results with the world by working with other students, their teachers, and their communities and professionals around the world.

The interdisciplinary, cooperative and applied nature of challenge-based learning makes it ideal for students of all ages. This teaching method is designed for educators from primary school to

ISSN-p 2306-7365
ISSN-e 2664-0686

higher education who want to implement a teaching method based on the difficulties in the learning environment. Challenge-based learning is becoming a workplace in the 21st century. To meet the purpose of this approach, participants should do the following:

- Work in joint groups;
- Use of widely used technologies in everyday life;
- Solve specific problems using a multidisciplinary approach;
- Share results with the world.

Challenge-based learning begins with big ideas and continues to the following stages: the essential question; challenge; guiding issues, activities and resources to be guided; determination of the decision; to act through the implementation of the decision; evaluation; make a decision and share it with the world (Figure 2). Reflection and information assessment are an important part of the process at every stage, as they enhance learning and prepare students for the next events.

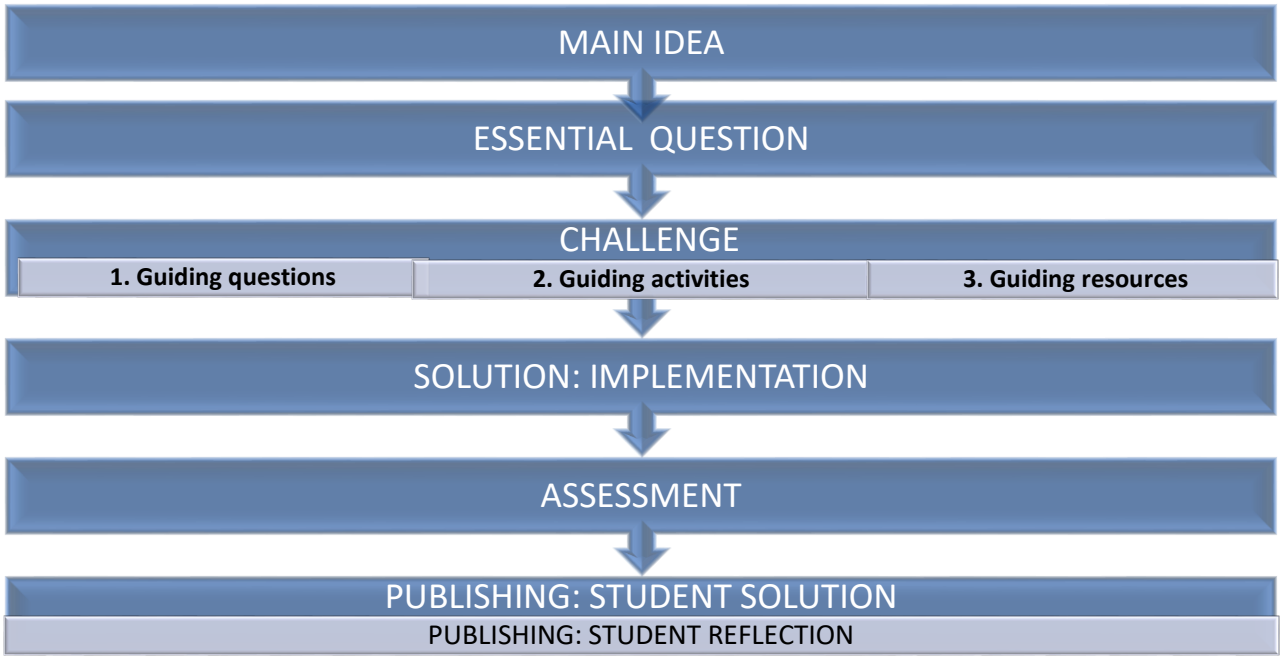

Figure 2. The structure of the challenge-based learning approach

Although the teacher's participation in the challenge-based learning process is very important, its nature changes as students move forward in their own stages of the process, that is, students' human development in the process. At the beginning of the process, when a teacher introduces a challenge-based learning program to students and finds a solution to a problem, it means that the teacher has made decisions, exchanged information, developed learning skills, and answered questions about how the process works and what is expected of students. In the middle stages of the process, students are responsible for planning and researching their work, and the teacher primarily serves as a project manager and mentor who works with students, helping them through inconveniences and keeping them on track. In the final stages, students are busy with their work, but the teacher ensures that they have mastered the necessary knowledge and skills through appropriate assessment. Finally, the teacher takes on the role of a product manager who supports students as they implement, evaluate, and publish their decisions and results.

The challenge-based approach focuses on the study of topics through a variety of topics and the subject matter of different disciplines, allowing students to assess the natural connections between thematic areas that are not always clear. As a result, it works best when teachers of

different disciplines work together. One of the most useful and positive aspects of this approach for professional growth and development is that teachers working in challenge-based learning programs interact with other subject teachers, as teamwork develops important life skills in students.

Challenge-based learning requires real-life tools, so teachers and students need access to technology that is often used in 21st century life and work. These tools include computers, multimedia tools, the Internet and mobile devices that allow to access excellent information, content and communication anywhere, anytime. In addition, because teachers and students work in groups, not all of the work is done during the lesson, which means that the teacher should create a workspace available to each student 24 hours a day, seven days a week.

At least, the workspace includes a calendar, a place to store notes, documents, and other digital tools such as PDFs, video clips, audio and video podcasts. There are many resources for creating collaborative workspaces. For example:

• Apple tools: the resources including iWeb, iWork.com, MobileMe and Mac OS X Snow Leopard provide a set of tools for creating a collaborative environment to support challenges.

• Wikis and other free web tools can be configured to work with classes and community groups.

During the process, teams and individuals have the opportunity to create a variety of products, including: invitation proposal videos, guiding set of questions, research plans and results, beta testing plans and solutions with evaluation options, solution videos, student journals, and individual videos. The quantity and quality of products depends on what stage of the process students enter, their class level and the duration of the task. At the beginning of the challenge-based learning process, teachers and students need to work together to identify products and how they are evaluated. Examples of student products for challenge-based learning include the following (Table 3):

Table 3 – Student products by challenge-based learning

1	Challenge proposal. Student teams present a short (one- or two-minute) video explaining the big idea, the essential question, and the challenge, including why it is important. The proposal should act as a challenge to other people to find solutions to the problem.
2	Guiding questions. Once the main challenge, that is, the problem is posed, students produce a set of questions to help them find a solution to the problem. The set of questions should be wide-ranging and represent the needs of each team member.
3	Research plan and timeline. This stage is mainly aimed at organizing the students' own efforts to study and answer questions. A well-designed plan provides a thorough and organized learning experience as students seek solutions to problems. The plan also allows to manage student’s learning experience. The teacher serves as a guide or mentor to maintain the timeline.
4	Implementation and evaluation plans. Once the solution is developed, students make a plan to complete the task and evaluate it. The plan should include an in-depth description of the solution, how it is defined, where it is implemented, and how participants and success are measured. If time permits, the plan may include a beta testing process with multiple evaluation cycles.
5	Solution video. After the decision is made and evaluated, each team creates a video that offers a solution to the world. This video provides information about the team, a statement of the difficulty / problem, the importance of the issue to them, how it was implemented, how it was measured, and how successful it was. Students must collect the videos, audio, and images they need to use in the decision video during the practice.

ISSN-p 2306-7365
ISSN-e 2664-0686

Continuation of table 3

6	Student journals, written or video. This stage allows students to document their individual and group experiences through written journals (blogs, wikis, social networking communities) or video journals. The teacher can monitor the progress of students through written or video journals, which are considered as part of the assessment process.
7	Final reflection videos. At the end of the experiment, students should demonstrate what they have learned about the content, process, and general experience. This allows students to organize and present their ideas in a short time.

Teacher planning and preparation of assessment strategies. To assess students' knowledge and the final products they develop, the teacher must focus on three areas: the content and interpretation of knowledge, the acquisition of life skills, and the challenge-based learning process. The challenge-based curriculum helps students develop in-depth knowledge and understanding in topical areas, as well as content and innovative skills, life and career skills for the 21st century.

To prepare himself and his students for the assessment of their work, the teacher considers two types of assessment: informational and summative. Informational assessment is ongoing throughout the process, improving and facilitating learning, and summative assessment assesses a student's development at the last point of the process or in the conclusion.

Results and discussion

Challenge-based learning is a collaborative learning approach and innovative technologies are widely used, as students often work in informal group settings or online and are constantly exposed to a variety of feedback that can constantly deepen learning or confuse how they are used. For example, in addition to teacher feedback, students receive feedback from other students working in the same physical and virtual workplaces, as well as through wiki development, blog responses, text messaging, verbal interactions, or video / audio responses. It also provides feedback to colleagues, parents and families, experts and others by allowing students to make their own decisions and upload them to the website.

Official resources of information assessment vary considerably and may include student journals, interactive reviews, teacher reviews, student-pedagogical conferences, temporary work reviews (based on headings) and more.

In order to explain all the feedback to the students and prepare them for useful use, the teacher should conduct regular checkpoints with individual teams, create goals, explain the stages and timelines of the process and create a special schedule to stimulate reflection. Challenge-based learning gives students a lot of responsibility, and the role of the teacher is very important. If the teacher knows more about the progress of each group and their feedback from all sources, he or she can offer help when needed. Examples of some observations that can be used during the control period are:

- What part of the process are you working on this week?
- What new knowledge and skills did you learn this week?
- What was your biggest success this week?
- What was the biggest challenge of the week?
- How does the team work as your team?
- What are your top priorities for the coming week?

Summative assessment can be taken in various forms to meet the needs of the teacher's specific situation. With the help of challenge-based learning, the summative action is based on the completion and implementation of the solution. The solution to the problem is tested in real life and students get quick and direct feedback.

The assessment should focus on how to assess students at the group and individual levels. Students can be assessed through traditional school and district assessment systems to determine subject and content knowledge. Other evaluation ideas include oral presentations, conference presentations, and job evaluations for the specific role you play in your team. In the planning process, it is important to define a summative assessment and give students specific expectations and rubrics. Real-life summative assessments, such as performance appraisals and conference presentations, provide students with good service skills.

Challenge-based learning encourages students to take action on their decisions at home, at school, or in the larger community. The teacher can help students find solutions to problems by helping them find community partners. When planning an issue, the teacher should schedule time to identify potential community partners, arrange meetings with stakeholders, and send news releases to people who may be involved in finding solutions to the problem. If students try to change the way the school uses paper, for example, other teachers and administrators must be notified by the teacher that students have made changes. If the decision takes a long time, students should engage the community with short updates and meetings. Students can do this too; It is the teacher's job to assign each group to write weekly "news" about what they have discovered and what they plan to do, and then to collect and distribute them through local newspapers, blogs and community forums.

One of the biggest differences between challenge-based learning and traditional teaching methods is what they ask and require from schools and teachers. With the help of challenge-based learning, schools develop from information repositories to learners to acquire real-world knowledge, skills to solve real-life problems, and skills that can be used to solve complex problems in the rest of their lives. Similarly, there are more teachers than information experts; they mobilize the efforts of students, seeking new knowledge with students, working together to model positive mental habits and new ways of thinking and teaching.

The role of partner, coordinator can be very difficult for teachers. The teacher can speed up the process, reschedule activities, and draw students' attention to decisions. However, it is important to give students time and space to make mistakes, follow false paths and correct their course. It is not necessary for a teacher to know how to solve problems. In fact, if a teacher plans to solve a problem correctly, he will not be able to know the answer in advance. Challenges are real because they are real, and they are not easy to solve. There are many "correct" answers to a problem, and the teacher's role in "challenge-based learning" is to find solutions to problems with students [20].

The teacher focuses on the different parts of the challenge-based learning process for students, especially since it can be very difficult for them to remember a large-scale picture of the process. As a project manager, the teacher can help them understand when to complete one phase and when to move on to the next. The teacher should remind students to take their calendars and work plans with them and help them learn to manage time.

The differences between challenge-based learning and other methods are presented in Table 4.

Table 4 – Differences between challenge-based learning and other methods

	Discovery-based learning	Problem-based learning	Experimental learning	Challenge-based learning
Cognitive target	Demand for knowledge	Knowledge building	Experience transformation	Understanding, demanding and designing knowledge
The role of the student	Detective	Researcher, participant	Active participant, selector	Active designer
The role of the teacher	A secret writer	A coach	A facilitator	A coach, co-researcher and designer

ISSN-p 2306-7365
ISSN-e 2664-0686

As we can see, challenge-based learning is a change in the roles of teachers and students. The role of students seeks to be a self-regulated (or group) self-regulating "researcher" who interacts using construction and design tools. Due to the open nature of the research question under study, the role of the teacher is more focused on being a coach or a co-experimenter.

Conclusion

In conclusion, challenge-based learning has become a mirror of the workplace in the 21st century. Based on this approach, students work in groups and use technology to solve specific problems in terms of school, family or community. The task for teachers is to work with students, to obtain content of interdisciplinary standards, to incorporate it into what is happening in today's world and turn it into an experience that changes students in their community. To achieve this goal, it provides students with the structure, support, checkpoints and tools necessary for their successful implementation, as well as gives them the freedom to self-governance, creativity and inspiration.

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