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**Адреса редколегії:**

Луцький національний технічний університет,  
кафедра комп'ютерної інженерії.

вул.Львівська 75, ауд.141

м.Луцьк, 43018

тел. (0332) 74-61-15

E-mail: cit@lntu.edu.ua,

ekaterinamelnik@gmail.com

сайт журналу: **ki.lutsk-ntu.com.ua**

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Olena Sivakovs'ka, Ph.D

Lutsk National Technical University

## SUCCESSFUL STARTUPS: HOW TO TEACH STUDENTS

**Olena Sivakovs'ka. Successful startups: how to teach students.** The article considers the features of startups teaching. There have been proposed implementation opportunities of information and innovation technologies into the learning process for Master's degree in Project Management. Unconventional ways in Startup Project Management have been showed too.

**Keywords:** startups, projects, management, business, ideas, innovation, technology, success.

**Сиваковська О.М. Успішні стартапи: як навчити студентів.** У статті розкриті особливості викладання стартапів. Запропоновані можливості впровадження інформаційних та інноваційних технологій у навчальний процес підготовки магістрів у сфері управління проектами. Представлені нетрадиційні підходи управління стартап-проектами.

**Ключові слова:** стартапи, проекти, управління, бізнес, ідеї, інновація, технологія, успіх.

**Сиваковская Е.Н. Успешные стартапы: как научить студентов.** В статье раскрыты особенности преподавания стартапов. Предложены возможности внедрения информационных и инновационных технологий в учебный процесс подготовки магистров в области управления проектами. Представлены нетрадиционные подходы управления стартап-проектами.

**Ключевые слова:** стартапы, проекты, управление, бизнес, идеи, инновация, технология, успех.

**Introduction to research problem.** When students are interested in business, in new ideas and want to have a good job, startup lecturer can help them. However, operating a startup has some key advantages that those big businesses simply aren't able to touch. Knowing these advantages, and playing to them, will help students' startup remain strong even in the face of decades-experienced, national-level competitors. But working for a startup can involve a lot of risk, that's no secret; according to the Wall Street Journal, three out of every four startups fail. But that doesn't mean taking a job with a startup – even one that ultimately fails – won't allow students to gain valuable experience and skills to add to their resume.

**Research analysis.** The problems of startups development are practiced by Oksana Borysenko (co-founder of "Enable Talk", Ukraine), Matt Aimonetti (software developer, co-founder of "Splice", USA), Rafis Abazov (researcher of Al Farabi Kazakh National University), Lisa Chesser (researcher of Florida International University). These people work hardly for the development of startup projects in the world. There are many companies, businessmen, manufacturer and investors, who are really interested in Startups today. Now many universities in our country introduce the discipline "Startup Project Management" in their educational programs too.

**Presentation of the basic material and substantiation of results.** The introduction of new educational strategies of methodological support increases not only the effectiveness of the process for preparing the student as a specialist, but also it influences the development of the teacher competencies, the achievement of modern awareness and the using of innovative educational technologies. The dynamics of the development and application of information and communication technologies is a reflection of the need to increase the level of teaching and the use of technical means for instruction to create a training channel between the teacher and students through telecommunications networks, and the create a virtual educational environment [1].

Now the world is more difficult, there are so much information and innovation technologies, and students of 21 century are cleverer and more adroit. So, the teaching of startup projects is very important today. With the help of this, our students can show their intelligence, their ingenuity and their uniqueness. Many universities around the world encourage business ideas from students and provide all kinds of support (often free) to student-led start-ups. This is a unique opportunity for innovative and forward-thinking students to set up their own start-ups—with the dream of coming up with a new Google, Facebook or Apple! It is pity, the majority of universities in our country can't do it. That's why students must find some investors, companies and etc., if they really have new and important ideas.

Recently, start-ups have become a kind of profession. Of course, this is not entrepreneurship in its pure form, because entrepreneurship implies the existence of some finished business model: you need a clear financial plan that allows you to understand the recoupment of your idea; understand when and what resources are needed to implement them, and so on. When creating a business, we plan our future well enough. A startup is a venture history: the task is not to build a profitable business, it demonstrates the

exponential growth of a certain set of metrics. If you earn with the help of startups – it's great, if not, it's not confoundedly.

So the task of the teacher is to help each student understands all aspects of this discipline. All students must be able to create new ideas, form own mind, differentiate advantages and disadvantages startup projects and at last they must be good “businessmen” and orators.

Teaching students about startups and small business inside the auditory room not only meets any set of standards, it prepares them for life. Students learn about brainstorming ideas, setting goals, budgeting, and indulging their individuality while still learning to cooperate with others.

On top of that, with the job market constantly fluctuating and the dismal outlook portrayed by the news, it's even more crucial to teach students about business. How teachers do this really just depends on their own individual personalities and preferences. However, this is the one time when a student should choose something they like first then the teacher can act as a guide [2].

Therefore I can propose some approaches that can be used in startups teaching.

There are: success stories, business letter, business plan, risks and benefits, types of businesses, auditory jobs vs. entrepreneurship, “the million-dollar question”, make money, budgeting, banking, spending money, turning a profit, balance checking accounts, supply and demand, observe consumer behavior, inventions, known information, the history of business, currency exchange, clubs, online stores, evaluate, project runway, advertising agency.

Let consider advantages of each approach.

*Success stories.* The teacher must read success stories with students. This can range from news or feature stories to historical pieces. One such story about Sarah Breedlove Walker introduces students to “a rags to riches” journey of one of the wealthiest black women in the 1900s. If teachers compare that with a story of Oprah Winfrey and her millionaire status, students will learn and find great inspiration for building a business from the bottom up [3].

*Business letter.* A teacher must teach students to write business letter correctly. A student might write a business letter to solicit interest from investors or possible consumers. The point being that the student should present the value of the business on several levels through formal language.

*Business plan.* Without a plan, anyone can lose his or her focus on a goal. If students write a business plan, they'll get a solid understanding of what it takes to start their own business. The teacher must explain how write this plane (explain all steps of the plan, all aspects and etc.).

*Risks and benefits.* Along the way, students should weigh the risks and benefits of whatever business venture they choose. The teacher can use tool, “The Balancing Act” Activity, as a visual for students. With the help of this, the lecturer can visually explain all risks and benefits of startup projects.

*Types of businesses.* A teacher must take students from start to finish through a business model. A lecturer can give them a specific type of business to focus on, delving into the ins and outs of making this business work. For instance, if students were to focus on different startups, they could start with <https://startup.ua/>. But if a student want to use this site, he must registrate there. The lecturer can show students the differences and similarities while providing them with invaluable details about starting and maintaining a successful business.

*Auditory jobs vs. entrepreneurship.* During the startup's lecture, a lecturer can create a sense of responsibility by giving each student a job and add a twist. First he must assign jobs such as white board cleaner, agenda and date manager, art director, and so forth. Assigning more important names to jobs works really well with older students. Then a teacher can listen to complaints and allow them to switch out jobs for a couple of week. Ultimately he needs to ask a series of questions to get them thinking. For e. g.: Would you be happy doing this when you're out of our university? How could you turn one of these skills learned into a business of your own? Or, do you prefer working for someone else? What are the benefits? What are the drawbacks? All of this will help them understand responsibility and decide what route works best for them.

*“The million-dollar question”.* Simply the teacher can ask a question: Do you want to be a millionaire? Then, he can ask some more questions and help guide students through an engaging lesson full of percentages, decimals, data analysis, number sense, solving equations, and problem solving. This lesson requires small stories and flexibility so keep that in mind when approaching any obstacles [3].

*Make money.* Starting a business may begin with an idea or a desire for independence but no business moves forward without money. That old adage, which seems obvious to an adult, “You gotta have money to make money,” isn't so apparent to a kid. So while teaching them the facts of dollars and cents for any grade level, instill this concept into them and have them list possible sources of funds [3].

*Budgeting.* Then the lecturer must ask the practical question of “How much money will you need?” Depending on the business type, students need to decide how much money they’ll need by creating a budget.

*Banking.* A teacher can ask, “How will you get that money?” But the lecturer must help them to answer through their own personalized lesson or by sending them to the bank. Now a teacher has students learning about borrowing money from the bank. Teachers can take many avenues to get to the point where students borrow the money. Along the way, there are more than enough learning opportunities, from learning about interest on loans to problem solving. Teachers can also find ideas to carry into higher grade levels.

*Spending money.* One of the single most serious aspects of dealing with money involves spending it. Students need a heavy dose of reality when it comes to simpler consumer spending. Some sites do a great job at conveying the importance of this with facts and information. Startups’ teacher can use special site to teach students how to spend wisely and carefully.

*Turning a profit.* Exemplifying what turning a profit means to a group of students seems simple enough, but it’s challenging. If students haven’t even had a job, how can they possibly grasp the reality of turning a profit from a small business start-up? Well, that’s what teachers are for and that’s why teachers have great resources such as [www.richkidsmartkid.com](http://www.richkidsmartkid.com) Video games help teachers introduce ideas and lessons broken into grade levels help teachers cement some important concepts including the idea of making a profit [4].

*Balance checking accounts.* Many people find balancing a personal checking account difficult not because it’s a difficult concept, but because there are so many bills to pay. Taking some time to show and discuss paying bills and balancing accounts helps students with basic level of responsibility. The mint offers simple, digital lessons.

*Supply and demand.* Many students like video games. Is a great tool that will challenge students to build a small business and turn it into an empire. There is many videogames that help to create a new business virtually in the Internet. By introducing students to the idea of creating a trade company, it provides them with important lessons in supply and demand.

*Observe consumer behavior.* A lecturer can conduct an experiment with consumer behavior. He must introduce students to the stock market and link that with checking the news. But, more importantly, have students observe their own and their family and friends’ consumer behavior. That will make this so much more interesting. Then, students must come up with economically effective ways to solve or enhance some of the behaviors they’ve observed.

*Inventions.* Inventions and business should go together. That’s why young inventors need exposure to the business world. The teacher must start by questioning them: “How will this invention affect the world around you? How should it be marketed? How can the inventor hold on to a majority of the profits?” A startup researcher can show them the reality, that most inventors retain only 1% of profits. That’s why learning about business is so vital to students’ success.

*Known information.* In any project, there is a stage when you need to sit down and digest all information you’ve collected, all contacts you’ve approached and all opportunities you’ve explored. This is a very important stage when start-up hopefuls have not only to do the SWOT analysis (assessing Strength, Weaknesses, Opportunities and Threats) but also to decide where and how to move forward. At this stage it’s also important to digest the wealth of information you’ve collected into a good presentation for yourself and for all your friends, stakeholders and sponsors to get their feedback, comments and suggestions [5].

This is a stage when it is also essential to ask yourself honestly: is this project good enough for upscaling and moving forward as a serious once-a-lifetime opportunity? Or, is it a nice student-scale project which has provided experience and expertise in start-ups and satisfying your own ambitions, but not enough to become a large breakthrough innovative product?

Overall, it is important to remember that in building the first start-up it is equally important to build first team of friends and classmates. This combination – brainstorming and working up on students’ idea and building a team for this and many other projects – will help them to be successful in creating start-ups and developing innovative ideas.

*The history of business.* A teacher must compare students the various types of economic systems over time. This will help them understand where money came from and why. It will also help them understand how the credit card has changed the way they understand value, often disregarding the prices of various products and services.

*Currency exchange.* A startup researcher can ask students choose parts of the world where they think their product would sell or their business would thrive. Then, he can ask them determine exchange rates. They might want to stick to one continent, but it's always more interesting when they choose. Students will not only learn by using world maps but also begin to understand the value of money across continents.

*Clubs.* Various types of clubs help students socialize in an environment where they can be themselves so why not use the clubs to see the business side of their interests. Clubs often organize events or fundraisers to promote themselves so teach them some business skills along the way.

*Online stores.* The next step might be to show how students can set up an online shop. Of course there's so much more to business and entrepreneurship than just creating a place to sell the product, but it gives them a resource and a starting point for motivation.

*Evaluate.* A very important part of the process of start-up development is to realistically evaluate how much support students need for their start-up project. They must remember a historic fact about the importance of comprehensive evaluation for e. g.: in 1976 Stephen Wozniak, an engineering intern at the Hewlett-Packard (HP) Company, built a prototype of the first personal computer. However, after a quick evaluation HP decided the idea was not worth investing in, and declined to support the project. Thus, Stephen Wozniak joined Steve Jobs to create the Apple Corporation – a company which is currently about 10 times larger than HP.

One big mistake that students (and other start-up beginners) make is to focus exclusively on monetary support for their projects. Yet, case studies from many countries suggest the importance of getting human resource support and technical assistance, such as patent application and registration, and for the evaluation of market environment for the innovation [5].

*Project runway.* Creating a competitive environment out of a single project and offering prizes for the winners gives students a taste of how difficult following through on a goal can be but also how rewarding a win can make they feel. A lecturer can use this to show them how designers start their own lines. The website for the show Project Runway has some great clips to show students. [www.mylifetime.com](http://www.mylifetime.com).

*Advertising agency.* A startup researcher can give the students a chance to create their own advertising agency. A teacher must create small groups of three or four students and have them come up with campaigns in print and digitally. Depending on the time and extent of lessons, a lecturer can challenge them to help come up with unique and campaigns for products they know and love. The teacher must make sure they place a value on their work and research how much ad agencies charge for various types of work. So the lecturer must compare large ad agencies to the smaller ones.

At first startup lessons, the teacher can ask such question: What is the common factor between Bill Gates, Steve Jobs and Mark Zuckerberg? On the surface the answer is very simple: all of them began their iconic projects during their university years and often only with the help of their closest friends. However, we have to dig deep inside their way of thinking, brainstorming and creating to understand the “magic bullet” of their success. Professors and students at business schools around the world have spent thousands of hours to deconstruct the mysteries of their success and to replicate their experience in the new environment.

Many years of experience in working with student start-up projects suggest that the next very important step in converting each idea into a workable start-up is to explore funding opportunities to finalize the ideas into a viable project and – if possible – into a workable prototype.

In the rapidly changing and extremely competitive business environment, often it is not enough to just show nice presentation slides and calculations on paper, as it might not work even for the most brilliant and potentially marketable ideas. A workable prototype will greatly increase students' chance of success, and therefore it is critically important to explore all existing opportunities for support.

And here the university environment might be able to help. During the last decade, many universities have established business incubators and techno-parks as innovation support institutions with a single mandate: to support students in various ways to start successful innovation projects and systems or to create industry-science linkages.

For example, a techno-park at Al Farabi KazNU – created in 2011 as an industry-science collaboration center for commercialization and technology transfer – currently supports about a dozen student projects at once. It also provides space for brainstorming and for writing up business proposals for students' projects and regularly organizes various workshops and seminars for students and faculty about various aspects of building start-ups and getting help for most prospective ideas [2]. In fact, at many

universities around the world, the financing of innovative entrepreneurs is built around four major sources: 1) in-house funds; 2) university-affiliated funds; 3) private alumni funds, and 4) private investment-angel funds.

At last a teacher must show students a sense of their own independence and matching that with their interests demonstrates just how much they can do with all of their skills and talents. A startup researcher must help students learn more about the world they live in and how they interact with it keeps them interested and provides them with valuable information critical to their ability to find happiness and success in a perpetually changing world.

**Conclusions and Perspectives.** Today the startup is that it is based on unique or creative idea and we all know that in this world where technology and consumer taste are changing so fast, an unique idea can do wonders because there is no limit as far as profit margins are concerned when it comes to startup as there is no benchmark against which these startups can be compared and hence they have monopoly over the pricing of product because uniqueness does not have any substitutes. Students can have a positive experience in the discipline of Start-Up Projects. They can acquire many useful skills, including the skill of public speaking, the ability to work with information and visualize it, conducting interviews, the ability to build on the opinions of consumers. Students can learn the culture of discussion, the ability to objectively evaluate their ideas, critical thinking. At last I can say most startup jobs won't pay as well as some of the bigger corporate and business jobs. So this discipline will be interesting for students, who want be rich, popular and is interested in the creating of new ideas for our country.

1. How to seed successful student Start-ups: [Електронний ресурс]. – Режим доступу: <https://www.topuniversities.com/blog/how-seed-successful-student-start-ups>.
2. Стартапы как новый школьный предмет: [Електронний ресурс]. – Режим доступу: <https://newtonew.com/school/startups-at-schools>.
3. Classroom Startups To Create and Learn: 50 Ideas To Bring Entrepreneurship Into The Classroom: [Електронний ресурс]. – Режим доступу: <https://www.opencolleges.edu.au/informed/features/classroom-startups/>.
4. Борисенко Д. В. Технологии стартапов в информационно-коммуникативном направлении развития вузовского образования [Текст] / Д. В. Борисенко // Сборник докладов Международной интернет-конференции «Информационно-технологическое обеспечение образовательного процесса современного университета». – Минск. – 2013. – С. 40 – 44.
5. Иншаков М. О. Инновационные стартапы в России: проблемы создания и маркетингового продвижения [Текст] / М. О. Иншаков, А. А. Орлова // Вестник Волгоградского государственного университета. Серия 3: Экономика. Экология. – Волгоград. – 2014. – С. 27 – 32.