A Report to Investigate Solutions to Increase Innovative Product Development of Students at Bilkent University

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ENG 401 - 09

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1 Introduction

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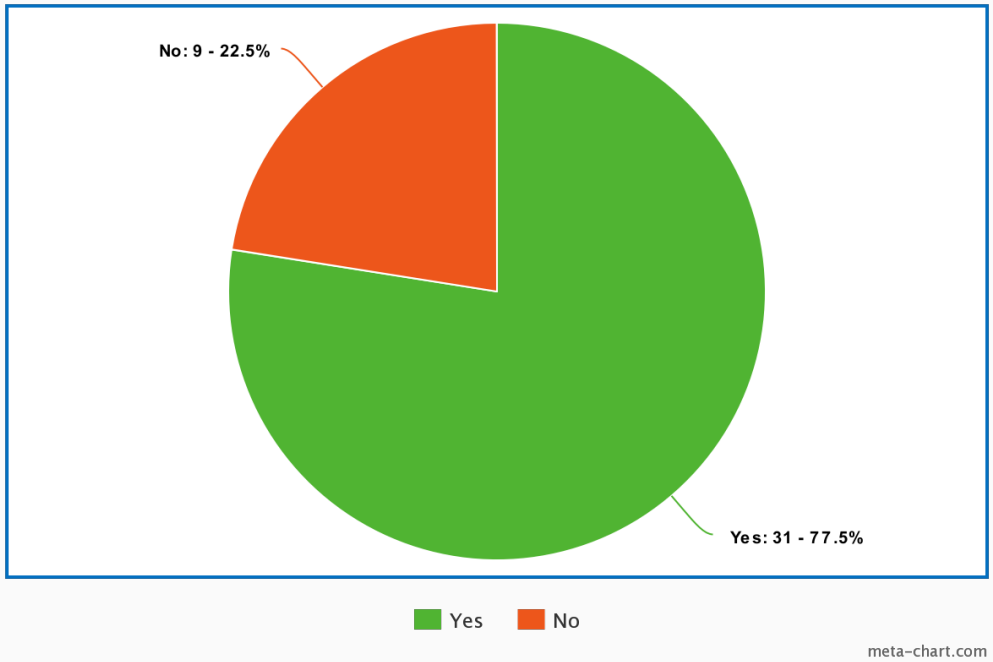

Figure 1: Survey results of 40 students [1]

Approximately 77% of the students from Computer Engineering have a project idea [1].

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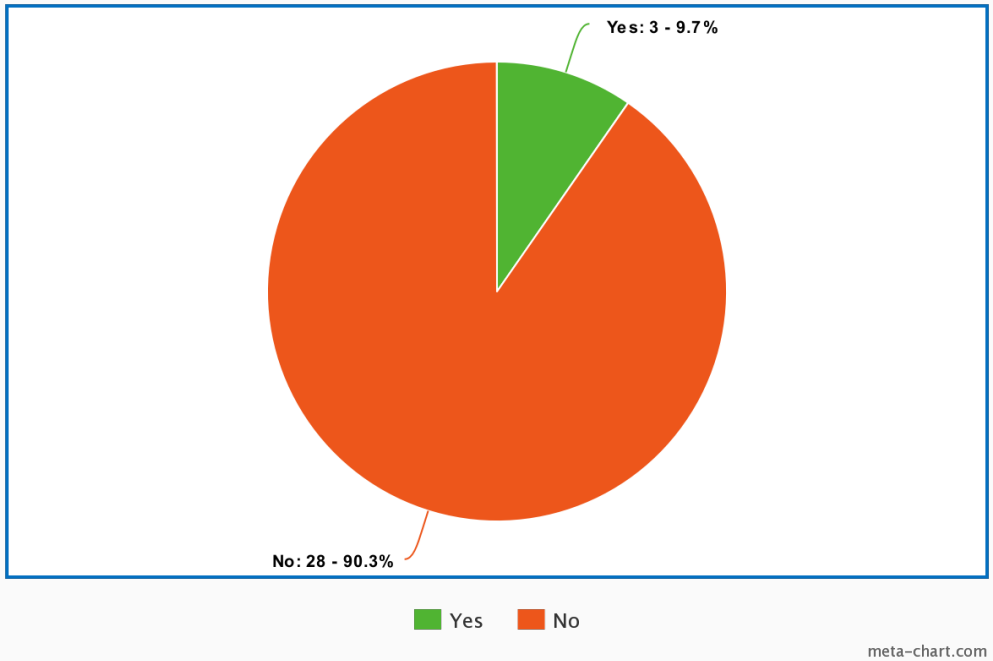

Figure 2: Survey results of 31 students [2]

90% of them say they have not enough money, knowledge or time to convert their ideas into a product [2].

2 Problem Definition

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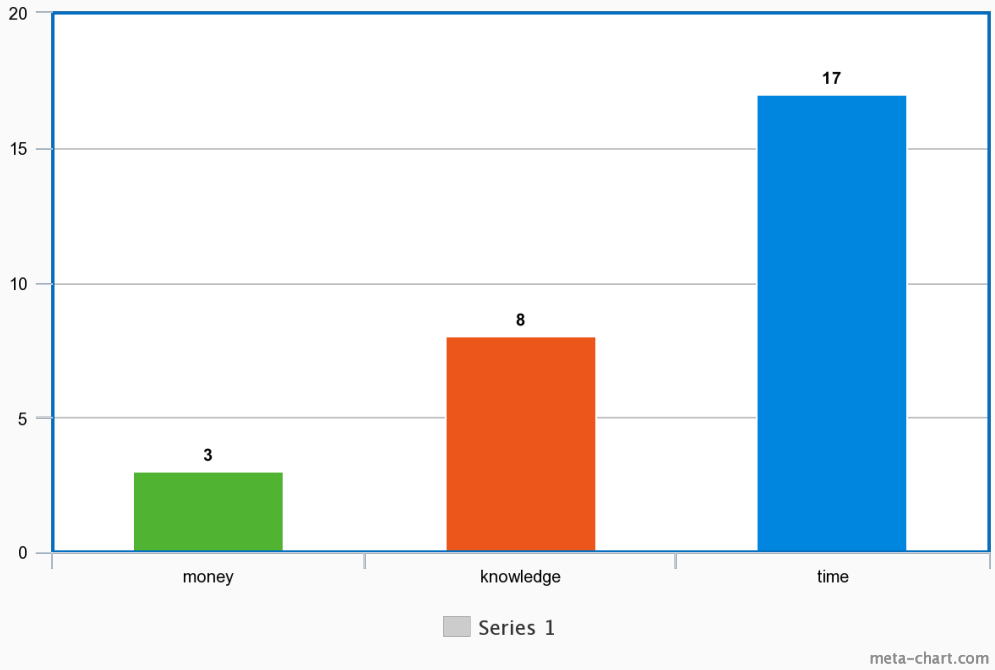

Figure 3: Survey results of 28 students [2]

10% of them have not enough money, 28% of them have not enough knowledge and 60% of them have not enough time to produce a product [2].

2 Problem Definition

Bilkent University Computer Engineering department does not provide an opportunity to students who want to produce something. Students cannot use their knowledge and skills to solve real world problems with innovative solutions.

3 Proposed Solutions

3.1 Innovative Courses

- The underlying skills, tools and technologies to develop products are thought at Bilkent University by high quality faculty members.
- However, some non-technical problems cannot be solved by using university learning outcomes such as building a business model, establishing a company, reaching to customers and building a team etc.

3.1 Innovative Courses

- Building Business Models, Cultivating the Entrepreneurial Mindset, Demand Creation: The Secrets of Driving Growth, The Power of Stories to Fuel Innovation, Leading Collaborative Teams and Product Marketing Essentials are some courses offered by Stanford University [3].
- Bilkent Computer Engineering Department can offer one course about Innovation and Entrepreneurship, like Stanford, in every semester so that students can gain essential skills throughout their education to launch their own ventures.

3.2 Innovation Lab

- The collaboration of scholars, graduate and undergraduate students are significant to develop projects and conduct researches.
- These labs can be managed by professors and students can provide new ideas to develop or attend to existing projects of professors or other students in the fast paced university environment.

3.2 Innovation Lab

- This collaboration can improve students' technical expertise by working with faculty and provide engineering students with an environment for innovation.
- Bilkent Faculty of Engineering can convert EA-Z01 class to a lab for the use of Computer Engineering faculty and students to produce innovative products.

3.3 Funding

- Funding can be accepted as one of the most significant part of the startups since 82% of startups fail because of cash flow problems [4].
- 77% of startup founders rely on personal savings for their initial funds [4] which is a significant problem for university students since generally students does not have much personal savings to fund and operate their own ventures.

3.3 Funding

- Bilkent University can create a fund system and fund their students' promising startup with TL50,000.
- The faculty members of Bilkent University were supported by a budget approaching TL600,000,000 within the scope of the projects of TÜBİTAK (604), public and private companies (311) and European Union (106) between 2005-2017 [5].
- Altough faculty projects are more complicated and needs more funding, Bilkent University can use their network to provide TL50,000 to their students, which is relativey small compared to TL600,000,000.

4 Criteria for Assessing Solutions

4.1 Effectiveness

Effectiveness of each solution was investigated and compared to find the most effective solution. The objective of this criteria was finding the solution which produces more innovation.

1. The impact of innovative courses to produce innovation will be analyzed to understand effectiveness of innovative courses.
2. The impact of innovative labs to produce innovation will be analyzed to understand effectiveness of innovative labs.
3. The impact of funding to produce innovation will be analyzed to understand effectiveness of funding.

4.2 Sustainability

Sustainability of each solution was investigated and compared to find the most sustainable solution. The objective of this criteria was finding the solution which produces more sustainable innovation in terms of time and skills.

1. The sustainability of offering innovative courses at Bilkent University was analyzed.
2. The sustainability of innovative labs at Bilkent University was analyzed.
3. The sustainability of funding at Bilkent University was analyzed.

4.3 Cost

Cost of each solution was investigated and compared.

1. The cost of offering innovative courses, which includes professor salary and classroom adjusting, at Bilkent University was analyzed.
2. The cost of innovative labs, which includes lab components such as PC and servers and lab personnel salary, at Bilkent University was analyzed.
3. The cost of fund raising, which includes TL50,000 funding to each promising startup, at Bilkent University was analyzed.

5 Research Methodology

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- Web research
- Interview w/
  Prof. Ugur Dogrusoz from Computer Engineering department
- Survey w/
  40 students who were in the CS 442 or CS 464 courses.

6 Result and Analysis

6.1.1 Effectiveness

- According to Prof. Dogrusoz, it is an effective solution since university can offer a course without any restriction and this course can improve the students soft skills [6].
- It is already used in universities such as Stanford University [3].

Effective ✓

6.1.2 Sustainability

- According to Prof. Dogrusoz, it is a sustainable solution because the new technologies and/or information can easily be added to syllabus and outdated topics can also be removed from syllabus [6].

Sustainable ✓

6.1.3 Cost

- Cannot find the hourly wage salary of a professor and dependency of their salary to courses which s/he gives.
- Computer Engineering department offers 73 undergraduate level courses in Spring 2019 [7].

Cost ✓

6.2.1 Effectiveness

- According to Prof. Dogrusoz, it is not an effective solution because rather than students, professors would use such a lab and deciding on which professor will use this lab cannot be determined [6].

Not Effective ✗

6.2.2 Sustainability

Not analyzed because the main criteria effectiveness was not maintained.

6.2.3 Cost

Not analyzed because the main criteria effectiveness was not maintained.

6.3 Funding

6.3.1 Effectiveness

- According to Prof. Dogrusoz, if students' spending can be controlled, then the solution is effective [6].
- It is already used in universities such as UC Berkeley [8].

Effective ✓

6.3.2 Sustainability

- There should be a mechanism that funded startups pay back their fundings if they earn money so that another student can use this funding again.
- There is no guarantee that any of the students startups earn money.

Sustainable ✗

6.3.3 Cost

Not analyzed because the secondary criteria sustainability was not maintained.

7 Conclusion and Recommendations

7 Conclusion and Recommendations

	Innovative Courses	Innovation Lab	Funding
Effectiveness	✓	✗	✓
Sustainability	✓		✗
Cost	✓		

As a recommendation, Bilkent University Computer Engineering department can offer a course per semester to improve students skills to produce innovative products.

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