

## ENTREPRENEURSHIP EDUCATION THROUGH INDUSTRY-ACADEMIA COLLABORATION AT GUNMA KOSEN AND ITS EFFECTIVENESS, Part 2

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One of the unique features of entrepreneurship education at Gunma-KOSEN is that "Introduction to Entrepreneurship" as a basic education course, has been made a required curriculum subject for first-year students. The decision to teach this type of content to first-year students was accompanied by concerns that it might be too early for them in terms of age, but the decision was made in consideration of the fact that the more accustomed students at KOSEN become to being in a group, the less likely they are to act spontaneously out of concern for their surroundings.

This course, which began in FY2024, consists of content that includes the social background of the need for startups, the importance of entrepreneurship, the socio-economic and financial structure, and the importance of intellectual property. The essence of educational goal of this course is for students to understand the elements necessary for starting a new business or project, such as the ability to think outside the box, conceptualization, imagination, and management skills, while learning how to think about finding and solving problems and how to proceed with projects. In this report, we will summarize the effectiveness of this course based on the evaluations and comments that students were asked to write throughout the 15 lectures of this course.

Through the entrepreneurship education we have conducted since FY2023 and by helping students participate in various contests such as DCON (Deep Learning Contest) or business contest, we have realized that students at our school are capable of coming up with ideas when given a problem, but due to their lack of experience, they are not very good at incorporating the process of solving a problem into a

feasible project and implementing it. They are also poor at spontaneously taking an interest in their surroundings and identifying problems to be solved. To help overcome these weaknesses, as our first attempt, we held an "On-campus idea contest for solving social issues" from the end of FY2024 to April of 2025. For this purpose, we have obtained cooperation from 16 organizations (city hall, newspapers, banks, and companies), centering on the Gun-Rei Techno Gathering, an industry-academia collaboration support group. Fifty-three students, mostly first-year to third-year students, have participated in the contest. In this presentation, we plan to summarize the results of the contest and the educational effects of the contest.

**Keywords:** *Entrepreneurship education, "Introduction to Entrepreneurship", for the first-year students, "On-campus idea contest for solving social issues"*

### Introduction

The Ministry of Economy, Japan (2022) announced its policy to make startups that solve social problems the mainstay of economic growth and formulated the "Startup Development Five-Year Plan". Included in this plan is the strengthening of entrepreneurship education at technical colleges. The Ministry of Education, Culture, Sports, Science and Technology, Japan (2022) planned the "Project to Develop Facilities and Environment for Start-Up Education at KOSEN" in the supplementary budget for FY2022. Our school was selected for this project and started the "Gunma-KOSEN Type Entrepreneurship Education through Industry-Academia Collaboration" in FY2023.

According to a web report by "Corporation Penmark," an independent survey of approximately 130,000 high school students found that 13.9 % of freshmen expressed interest in starting their own business, and 55.3 % of the respondents indicated that they aspire to establish a startup targeting an emerging market, rather than pursuing a small business such as freelancing or becoming an influencer.

The report also includes results from a survey of approximately 230,000 college students, revealing that 12.4 % of them expressed a desire to start their own business. Interestingly, the percentage of high school students wishing to become entrepreneurs exceeded that of college students.

Based on these findings, early entrepreneurship education at the high school level is considered highly valuable. However, our school was not founded specifically to teach entrepreneurship, meaning that while some students show interest in this field, others do not necessarily do so. Additionally, determining whether an individual is suited for entrepreneurship depends on various personal factors, making it unrealistic for the school to set a goal requiring all graduates to start their own businesses or establish a system that exclusively supports those who do.

For this reason, our school defines entrepreneurship as the ability to proactively shape one's own life. Our goal is to cultivate students' ability to take on challenges, develop creative solutions to social issues using ideas and imagination, and collaborate effectively with others to launch new businesses and projects.

In September and December 2023, two entrepreneurship education workshops (Realize Studio and Trial Factory) were established and began operation. These workshops are open to all students and graduates of the school, as well as members of the Gun-Rei Techno Gathering, the school's industry-academia collaboration support group. They were designed as spaces where participants could refine ideas based on their awareness of social and technical issues and work toward their realization.

At our school, technical support staff, rather than teaching faculty, take the lead in managing these workshops. In addition to their role in educational activities such as project-based learning (PBL) classes and graduation research, the workshops are increasingly utilized by students on a voluntary basis to prototype their own ideas. Details of their operation were described in the previous report.

This paper summarizes the outcomes achieved thus far through the "Introduction to Entrepreneurship" course for first-year students, as well as the educational impact of an on-campus idea contest held throughout the academic year, from February 14 to April 23, 2025.

### Outline of the "Introduction to Entrepreneurship"

According to a survey conducted by the Ministry of Economy, Trade and Industry (METI) from May 13 to June 12, 2020, of 1,459 start-up companies established within the past five years, 133 companies responded to the question: "Why do entrepreneurs believe there are not

enough start-ups in Japan?" The results showed that 37.6 % of respondents attributed this to a fear of failure, 19.5 % to a lack of entrepreneurs in their immediate environment, and 15.0 % to schooling.

To address these issues, the "Introduction to Entrepreneurship" course was introduced in fiscal year 2024 as a compulsory half-year course for first-year students, providing foundational education in the lower grades. In this course, two faculty members and 12 part-time lecturers from companies took turns teaching classes.

The objective of this course is to equip students with the ability to identify and solve problems, understand how to manage a project, and develop essential entrepreneurial skills, including creativity, imagination, and business management, so that they can consider entrepreneurship as a viable career option after graduation.

The syllabus for this course lists the following 10 objectives.

- a) To be able to understand the significance of entrepreneurship and its importance.
- b) To be able to think about the meaning of working and learning.
- c) To be able to understand the position and responsibilities of corporate activities in society.
- d) To be able to understand how work is carried out and the division of roles in a company, and what is important in corporate activities.
- e) To be able to understand product development strategies and how to proceed with projects in a company.
- f) To be able to understand the importance of the ability to judge issues from a broad perspective and solve them proactively.
- g) To be able to understand how to utilize intellectual property rights and their importance in corporate activities.
- h) To be able to understand the factors necessary for starting a business.
- i) To be able to explain the social significance and responsibility of various industries, occupations, and companies.
- j) To be able to think about the roles required of engineers in light of their impact on society, the environment, and people.

The first session of the course serves as an introduction, covering the fundamentals of entrepreneurship, the significance of work, and the purpose of learning. The course consists of a series of 15 weekly lectures, one of which is a regular exam.

From the second session onward, guest lecturers will include experienced entrepreneurs, corporate project leaders, company executives, and professionals who have contributed to society using their specialized knowledge. Drawing from their experiences, they will provide insights on the following topics:

- (A) Working in a company - understanding corporate structures and professional roles.
- (B) Intellectual property rights - protection, management, and strategic use.

- (C) Relationships with financial institutions - their social significance and impact on business.
- (D) Collaboration with local governments - the role of public institutions in entrepreneurship.
- (E) Case studies of solving social issues through imagination and entrepreneurship.
- (F) Product development strategies - successes and failures in corporate innovation.
- (G) Entrepreneurship from technical colleges - opportunities and challenges for students.

The course evaluation was designed to allow students to pass without the burden of excessive assignments or additional study outside of class, provided they attended regularly. To achieve this, 30 % of the grading was based on cumulative quiz from each session, while the remaining 70 % was assessed through a mark-sheet system featuring questions similar to those on the quizzes.

As a result, in the 2024 academic year, all students who took the course passed the exam without needing to retake it.

### Consideration of the timing of this course

The structure of the course was established through a pre-course consisting of six lectures offered to interested students in the 2023 fiscal year. Following this, "Introduction to Entrepreneurship" became a compulsory course for first-year students in the second semester of their first year in 2024. This timing was chosen to allow for a preparatory period and to ensure that students had already acclimated to the academic environment of the technical college, making the course more effective.

In the 2025 fiscal year, the course was moved to the first semester of first-year students due to the renovation of campus buildings, which limited the availability of large classrooms to the first semester. As a result, the first class of this course was held on the very first day of classes for first-year students.

In both 2024 and 2025, the first lecture in the series was titled "What is Entrepreneurship? On Working and Learning" and covered the meaning of work, career planning, and life after graduation.

There were initial concerns that discussing topics such as work, money, and even the broader implications of life beyond graduation, including perspectives on one's entire lifetime, might be too early for newly enrolled students. However, when the lecture was delivered, all students engaged seriously, demonstrating genuine interest in the subject matter.

A survey was conducted after the first lecture in the current academic year, with 207 first-year students responding. In addition to questions about the significance of work and success in life, students were asked whether they understood the concept of entrepreneurship after attending the lecture. To this question, 91 % (188 students) answered that they understood it fairly well, while 9 % (19 students) indicated that they did not understand it well. We believe this demonstrates that we are effectively introducing students to our school's entrepreneurship goals, a topic many are encountering for the first time.

Additionally, 200 responses were collected for the open-ended question, "Please write your impressions of the class", which was not a required part of the survey. This unexpectedly high response rate indicated strong engagement, and the students' feedback clearly reflected that they had internalized the lecture's content and expressed their thoughts in their own words.

From the responses to that survey, here are several. All of these are considered evidence that the timing of the class is not too early and that students are taking it seriously as their own.

"I often hesitate to take action due to various risks, but I realized that without taking action, success is impossible. I need to change my perspective on failure. Failing does not mean the end of everything, so from now on, I want to actively challenge myself and value cooperation with my peers."

"When heard about life after graduation, I initially couldn't imagine much. However, as I listened, I learned a bit about how to establish a vision for the future, which was very insightful."

"I used to think that work was just about earning money, but I never considered it as a source of fulfillment. This was a new discovery for me. Success means realizing one's dreams, and I want to achieve even small successes during my time at KOSEN to work toward my dreams."

"This was my first entrepreneurship class, and it provided a great opportunity to reflect on my future and further education. I would like to discuss my dreams with my family."

"I realized that I am close to becoming a working adult, which made my future feel more tangible. I want to keep thinking about my future, even in the next class."

"I understood the importance of going beyond my comfort zone and developing the ability to take action. Until now, my attitude was based on 'things will somehow work out' without a solid foundation. But now, I want to take action to make 'things will work out' based on actual reasoning."

"Through this class, I had to deeply consider my future path after graduation. I reflected on the reasons for working, what working means, and how I will work. I was able to gain a clearer understanding of my future dreams. I also realized that self-analysis is something I lack, so I want to further explore my strengths and who I am through my experiences at KOSEN."

"I had never thought much about living proactively, but this class helped me understand what jobs I might pursue, what skills I need, and why working is important."

"I learned not only about life after entering society but also about things I can start working on now, like thinking critically. Understanding how I can improve my current life will help me in both school and at home. I want to develop a mindset of setting clear goals and challenging myself without fearing failure."

"I was deeply moved to learn that my school supports not only my current student life but also my future. I will approach my time at KOSEN with a strong sense of

purpose and proactiveness. I appreciate the support I've received and will strive to meet expectations."

"This was my first time hearing about entrepreneurship, and I realized how essential it is in life. Having this mindset makes a huge difference. I also learned that it's okay to rely on others when I can't do things alone, which was reassuring. I was surprised to learn that KOSEN has workshops dedicated to skill development, and I would love to use them."

"The phrase 'It's okay to fail' resonated deeply with me, as I was afraid of failure. This class made me want to actively engage in various challenges without fear."

"Taking this class at the age of 15, when we are still developing our perspectives on work, earning money, and our future, was valuable. During my five years at Gunma KOSEN, I want to reflect more deeply on my future while growing as a person."

Based on these responses, we can conclude that introducing entrepreneurship education in the first semester of first-year students (age 15) at a technical college is not too early for them. However, this may be influenced by the fact that these students voluntarily chose to enroll in a technical college, which is a specialized educational track in Japan. Therefore, it remains uncertain whether this approach would be equally feasible for students in a standard high school setting.

#### Lean Canvas hands-on workshop, at the final session of the course held after the regular exam

At our school, the final session of the 15-week semester-long course takes place after regular examinations. During the final week of the "Introduction to Entrepreneurship" course in the 2024 fiscal year, a practical workshop on Lean Canvas, a method for structuring ideas into projects, was conducted as a culminating activity to reinforce the concepts covered in previous lectures.

For this workshop, more than 200 first-year students gathered in the gymnasium and were divided into 25 groups, averaging about eight students per group. To encourage interaction among students who had never met before, the groups were formed by mixing students across different classes and departments. A Lean Canvas framework was printed on A0-sized paper, and all team members contributed their ideas by writing on sticky notes and attaching them to the framework to complete their project plan. The social issues each group addressed were randomly assigned in advance.

At the start of the session, students were introduced to real-world applications of Lean Canvas in startup operations. They then engaged in group discussions to collaboratively develop business plans using the framework. Finally, representatives from five groups presented their projects in front of the entire assembly.

Despite having only about 30 minutes to construct their business plans, many groups successfully completed approximately over 80 % of their Lean Canvas framework and developed project concepts worthy of presentation. Faculty members observed that the speed of

project planning progressed more efficiently in groups where students spontaneously stepped up to speak and take on leadership roles. In an era when many students are hesitant to voice their opinions in public or fear making mistakes, one significant outcome of this course series was that many students demonstrated the confidence to speak boldly—even in groups where they were meeting their peers for the first time.

#### The educational impact of this course

The 1,944 responses collected from the final questionnaire, an optional survey, were categorized based on the 12 lecture sessions conducted during the Introduction to Entrepreneurship course in the 2024 fiscal year, excluding the initial introductory session and the final workshop. Figure 1 illustrates the distribution of responses across various thematic groups, expressed as percentages.

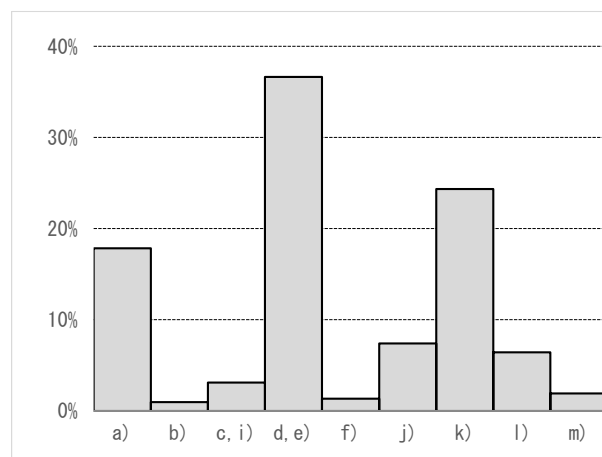


Figure 1. Percentage of which group the subject of the written comments belongs to. These thematic groups align with the syllabus achievement objectives previously outlined in this report and are classified as follows: a) the significance and importance of entrepreneurship, b) the significance and importance of working and learning, c,i) the position and responsibility of business activities in society, d,e) the way work and projects are carried out, f) the ability to judge things from a broad perspective and to solve problems independently, j) the roles they are expected to play, and k) gained the knowledge and the benefits by the course, l) impressed and enjoyed, and m) others.

The topics g) the use and importance of intellectual property rights and h) the essential elements for starting a business were not categorized among the written comments but were taken into account when selecting instructors, corresponding to (B) and (G) in the syllabus, respectively. Additionally, the significance of work and learning is thoroughly covered in the first introductory class, which is not reflected in this graph.

While this graph only illustrates the subject areas mentioned in students' impressions, it suggests that the coursework meaningfully contributes to the attainment objectives outlined in the syllabus. Notably, many comments highlighted a) the significance and importance



of entrepreneurship as well as d, e) the execution of work and projects. Furthermore, 30.7% of students expressed that k) the course was informative and enriching, while l) it was inspiring and enjoyable, indicating that students found substantial value in the subject.

Conversely, only 1.3 % of students commented on f) the ability to assess situations from a broad perspective and solve problems independently. This may be attributed to the fact that such skills cannot be fully developed through lectures alone and require continuous practice and experience.

While there are inherent biases when analyzing specific classes and subjects individually, when viewed as a whole, the course effectively addresses the achievement objectives set forth in the syllabus.

### Outline of the "On-campus idea contest for solving social issues"

Through lectures on entrepreneurial subjects in the 2023 and 2024 fiscal years and the call for contest participation, faculty members observed that while students at our school can generate ideas to address problems, their lack of experience hinders their ability to transform these ideas into viable projects and manage their execution effectively. Additionally, they struggle to spontaneously engage with their surroundings and identify problems in need of solutions.

To address these challenges, enhance students' ability to collaborate on projects, and foster proactive decision-making in shaping their futures, we organized an on-campus idea contest focused on solving social issues. The contest was co-sponsored by Gunma National College of Technology and Gun-Rei Techno Gathering, an organization supporting industry-academia-government collaboration. A total of 20 organizations, including city halls, newspapers, banks, and companies, primarily members of Gun-Rei Techno Gathering, participated as mentors and judges.

On February 14, marking the end of the 2024 academic year, 53 students ranging from freshmen to juniors launched the program. They were divided into nine groups, each working over a span of 2.5 months to identify and address social issues. Each student group was assigned a corporate mentor who engaged with them one to two times per week, either online or in person.

Faculty members have ample opportunities to engage with business professionals through joint research, but students have historically had limited interactions with industry figures - mostly through internships, company information sessions, and similar activities. This contest provided a groundbreaking opportunity for students to work alongside corporate mentors on an equal footing over two and a half months, shifting the focus from job-hunting and recruitment to real-world project collaboration. From the companies' perspective, the contest was a welcome initiative, offering them direct engagement with students without the filter of faculty oversight.

The final judging took place on April 23, 2025, during which students and their mentors presented their projects and showcased their prototypes.

The team that won the Grand Prize disregarded the business aspect of profitability, something only students have the freedom to do, and instead focused on solving the problem of portable toilets during disasters. Their project involved disseminating information on how individuals could create portable toilets themselves, earning them an award from the school's principal.

The Excellence Award went to a team that proposed and attempted to implement an algorithm for scanning documents that cannot be processed using a flatbed scanner due to their shape or sensitivity to strong light. Their method utilized video capture technology, and they received an award from the president of Gun-Rei Techno Gathering.

All nine student teams approached social issues from unique perspectives, working to develop solutions. As a result, each team received recognition, either from the judges' companies or through special awards.

### The educational impact of this on-campus contest

A questionnaire was administered to students who participated in the contest, with 32 responses collected. These responses were used to evaluate the educational impact of the contest.

Firstly, to assess their efforts, students were asked to rate their experiences on a five-point scale (with 5 being the highest) across eight questions. Below are the questions along with the percentage breakdown of responses:

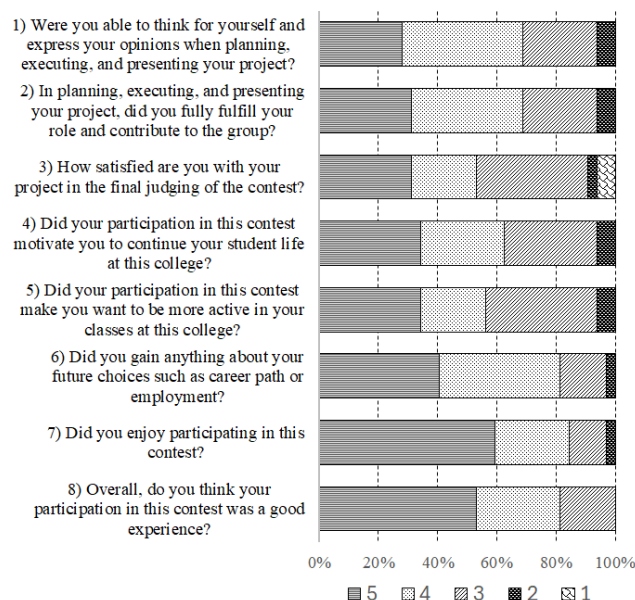


Figure 2. Numerical evaluations from students who participated in the contest. Each item was rated on a 5-point scale (5 = Excellent/High, 1 = Poor/Low).

In summary, less than 10 % of students (3 out of 32) selected 1 or 2 across all survey questions, while 5 or 4 were chosen by the majority of respondents for every question. This suggests that, overall, students rated the contest highly.

Questions 7) and 8) received the highest number of 5 ratings, followed by question 6), which focused on

students' perspectives on their future. This indicates that one of the contest's core objectives, helping students envision their futures, was successfully achieved. Meanwhile, the relatively lower satisfaction regarding project completion in question 3) was not due to a lack of effort but rather the limited timeframe of two and a half months, which restricted students' ability to fully develop their projects despite their enthusiasm.

In the second question, students were also asked to select the abilities they felt they had developed through participation in the contest. The numbers in parentheses represent how many students selected each option.

More than half of the respondents (**16 or more**) reported developing the following abilities:

- Originality and broad perspective – Identifying social issues and finding solutions (18)
- Analytical skills – Investigating problems and seeking solutions (18)
- Action skills – Acting proactively and executing projects (18)
- Objectivity – Evaluating projects from different perspectives (18)
- Membership – Collaborating effectively with peers to carry out projects (17)
- Planning ability – Incorporating solutions into concrete project plans (16)

These results suggest that the contest had a significant impact, encouraging students to think critically, challenge themselves, and engage with their projects meaningfully. The mentorship students received at key stages further contributed to this sense of fulfillment.

While this is based on self-evaluation by students, their efforts were also recognized by mentors, faculty members, and corporate judges who participated in the final judgement. In particular, the mentors who guided the groups throughout the project expressed admiration for students' creativity, initiative, organizational skills, and presentation abilities, especially considering their young ages 15 to 18.

Conversely, fewer than one-third of students selected the following abilities (fewer than 10 responses):

- Information organization skills – Structuring and presenting completed projects (8)
- Presentation skills – Effectively communicating ideas to an audience (5)
- Risk management skills – Anticipating and addressing risks proactively (5)

While these abilities are essential to entrepreneurship, participating in the contest alone was not enough for students to fully develop them. It is expected that these skills will be cultivated further through project-based learning (PBL) courses in higher grades.

## Conclusions

The "Introduction to Entrepreneurship" course for first-year students successfully conveyed the significance of entrepreneurship. Additionally, through insights shared by working professionals as instructors, students gained valuable perspectives on how to approach their future careers and projects. These experiences

encouraged students to deeply reflect on their own paths and aspirations. Student evaluations of the course included numerous comments expressing its value and enjoyment, indicating a strong demand for this content.

Furthermore, students who participated in the on-campus contest, which ran from the end of the previous academic year to the current year, worked collaboratively in groups for two and a half months under the mentorship of industry professionals. This allowed them to gain essential experience in project execution. As a result, students not only felt their own growth but also received recognition from those around them. The contest provided a rare opportunity for students to engage in long-term, direct communication with professionals without the filter of faculty supervision, broadening their perspectives.

Building on these experiences, it is hoped that students will actively participate in external contests such as DCON and the KOSEN Entrepreneur Summit. Through such engagement, they can further develop their independence and initiative. Ultimately, fostering a proactive mindset in students will not only enrich their school life and personal growth but also positively impact their academic achievements.

## Acknowledgements

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