Abstract

Purpose – This research aims to assess and compare project-based learning (PBL) designs to deliver technopreneur in higher education, as a case student of the Industrial Engineering Department. So, it can facilitate students who play a role in facilitating the process of technological transformation so the student knows well how to solve the problem of commercialization.

Design/methodology/approach – Undergraduate students of Industrial Engineering teams were given hands-on, collaborative projects conducted with two incubation centers, such as the Technology Incubator Center from the Agency for the Assessment and Application of Technology (AAAT) from the government of Indonesia and the Centre of Excellence for Electrical Energy Storage Technology (CEfEEST) from Sebelas Maret University (UNS), Indonesia. After completing the project, students will develop a final project which will become the basis for evaluating the implementation of PBL. The basis for the assessment uses a rubric designed through three sub-assessments: curriculum planning, report and presentation. This research uses the paired t-test method to see the average difference between the two groups of PBL in pairs and compare based on assessment results.

Findings – Implementing PBL between the two incubation centers (AAAT and CEfEEST) based on paired t-tests for each rubric assessment indicator showed most of them were significantly related. The assessment result gives the alternative to design the proposed PBL from AAAT, CEfEEST and a blended scenario for technopreneur education in the future.

Practical implications – The experiences and findings presented can help future PBLs provide technopreneur education based on comparing and evaluating learning outcomes in both incubation centers. Thus, it can produce a better PBL design to encourage the success of technology commercialization.

Originality/value – The assessment of PBL on students’ knowledge in technopreneur education by utilizing the paired t-test method to compare the assessment results of the final projects with the designed assessment
rubric. This evaluation serves as the basis for comparing the effectiveness of PBL implementation between AAAT and CEfEEST.

**Keywords** Technopreneur education, Project-based learning, Assessment rubric, Technology commercialization

**Paper type** Research paper

1. **Introduction**

The advent of technology, as mentioned by Trott (1998), can alter the perspective of an industry, where significant economic changes can globalize the world into a single market, with knowledge transforming into capital and resources. Over time, swift changes in science and technology offer opportunities for exploring emerging ideas and innovations. Now, higher education serves not only as a provider of education and research services but also as a hub for innovative activities and a catalyst for new knowledge and technology, as stated by Carayannis et al. (2015). According to Thomas (2017), universities play a pivotal role in educating agents of change for future development, equipping students with the competencies necessary to navigate and support transformation, particularly in technology-related fields. Additionally, universities have a vital role in fostering entrepreneurship, promoting regional development and advancing technology commercialization, as underscored by Seta et al. (2021), Sutopo et al. (2022) and Tafga Arfanindita et al. (2021).

Commercialization is a process to strengthen the relationship between science and the economy through technological transformation which is influenced by various factors such as infrastructure, technology, society, politics and history (Dehghani, 2015). Commercialization involves the active transfer of science and technology from universities and research centers to emerging industries and businesses. Universities play a pivotal role in this technology commercialization process by actively nurturing an entrepreneurial mindset among researchers, faculty and students, thereby facilitating the transformation of products or services (Addo et al., 2022).

Several cases indicate that technological products or inventions may face market rejection and find themselves in the “valley of death” (Biemans and Huizingh, 2020; Sutopo et al., 2022). This challenge often arises during the transitional phase between technology development and technology commercialization. Higher education institutions play a crucial role in streamlining the process of technological transformation to make it market-ready (Sutopo et al., 2019). The true value of technology emerges when it can either outperform existing technologies or is tailored to meet consumer demands (Mathews et al., 2019). Meijer et al. (2019) explained that the success of commercialization can be judged by how consumers or users perceive the technology’s worth. Expounding that the success of commercialization hinges on how consumers or users perceive the technology’s worth, Universities are expected to actively promote technology utilization and facilitate the transfer of innovative products from academia to various types of businesses.

The Indonesian Ministry of Education, Culture, Research, and Technology introduced an independent learning policy that facilitates students to develop skills according to their interests and talents. The program, which is commonly called the Independent Learning Independent Campus Program (ILIC), is intended as a bridge between university graduates and industry needs. One part of the ILIC program is ILIC entrepreneurial activities. This program aims not only to provide students with a practical understanding of entrepreneurship but also to create a platform for the implementation of technopreneurship and technology-based entrepreneurship. So, it encourages to successfully gain market acceptance and avoid the pitfalls often associated with technology innovation, such as the Valley of Death.
The ILIC program applies the project-based learning (PBL) model to the students involved. According to Radianto and Wijaya (2018), PBL is a learning activity in a class that focuses on the principles of long-term, interdisciplinary, student-centered learning activities. Many studies discuss the implementation of PBL in the learning process, such as learning the development of interpersonal competence (Konrad et al., 2020), perceptions of students and community partners (Amaral and Paulo, 2019) and student involvement in external consultations (Belwal et al., 2020).

Therefore, this study aims to evaluate whether PBL implemented with the ILIC program has yielded the anticipated output. The ILIC program was executed in partnership with two incubation centers: the Agency for the Assessment and Application of Technology (AAAT) owned by a Non-Ministry Government Institution, and the Centre of Excellence for Electrical Energy Storage Technology (CEfEEST) owned by UNS. A group of students will be divided into two incubation centers, where they will engage in learning experiences aimed at guiding new companies through the four stages of the innovation and technology transfer process (Sarmenta Coelho, 2000). The objective of this study is to compare the implementation of the PBL program in these two distinct locations using a custom-designed assessment rubric. The anticipated outcome is to generate valuable insights into instructional designs that can effectively deliver technopreneurial education, fostering the commercialization of technology.

2. Literature review
2.1 Project-based learning
PBL is an educational approach that centers around the principles of long-term, interdisciplinary and student-centered learning activities. PBL also creates an environment that is conducive to embracing mistakes and embracing change, where students collaborate to tackle problems and present their findings (Radianto and Wijaya, 2018). PBL can be defined as any educational approach that utilizes complex projects as a central organizing strategy for teaching students (Ngoh, 2015). PBL is also a methodology that emphasizes the construction of knowledge by solving problems (Laffey et al., 1998). Usai et al. (2021) describe PBL as an instructional strategy that enables students to learn through project-based work. The essence of PBL lies in its ability to engage students in real-world problems, fostering deep thinking within a problem-solving context. In PBL, the instructor serves as a facilitator, guiding students as they generate meaningful questions, develop practical assignments, build knowledge and social skills and critically evaluate what they have learned from the experience (David, 2008). Instructors play a facilitating role in PBL, similar to problem-based learning, but they also actively support students in the challenging process of constructing new understandings and viable solutions (Blumenfeld et al., 1991; Roessingh and Chambers, 2011).

2.2 Learning outcome from technopreneur education
PBL approaches emphasize creating workable solution choices by establishing case-specific problem understanding. Professional project management methodologies provide steps and resources to organize and support student work in this process. Instructors play a facilitating role, similar to problem-based learning, guiding students through the challenging process of constructing new understandings and practical solution alternatives (Blumenfeld et al., 1991; Roessingh and Chambers, 2011). Technology innovation, acceptance and diffusion can greatly support entrepreneurial innovations. The learning process has a significant impact on entrepreneurial learning and knowledge acquisition (Bhardwaj, 2021). According to Sarmenta Coelho (2000), the innovation process is represented in a circular manner, a model
frequently followed by many emerging companies in their development stages and by new companies that are currently in the development stage.

CE-FEEST is a Ministry of Research and Technology program in Indonesia to strengthen the institutionalization of innovation in the university environment. This institution is under the leadership of Universitas Sebelas Maret (UNS) and has the vision to become the center for developing energy storage technology for electric vehicle (EV) applications. This institution also has produced as many as 25 HKI and various research that can be commercialized. First is the research related to battery cell products, especially the standard development of battery cells for EV applications (Prianjani et al., 2016) and the financial analysis of the mini manufacturing plant of the battery cell 10 kWh (Sutopo et al., 2013). Second is the research related to battery modules or battery packs and their applications, such as standardization and testing the requirements of BMS for EV application (Khofiyah et al., 2019; Rahmawatie et al., 2017), technical feasibility battery lithium to support unmanned aerial vehicle (Khofiyah et al., 2019) and business strategy for battery swap EV with BMC (Sholichah and Sutopo, 2020). Third is the research related to electric motorcycle conversion (EMC), especially about sustainability evaluation of internal combustion engine motors (Habibie et al., 2021; Habibie et al., 2021), commercial strategy for EMC (Habibie and Sutopo, 2020) and business strategy for EMC facilities (Sholichah and Sutopo, 2020).

The AAAT is a Non-Ministerial Government Institution under the coordination of the National Research and Innovation Agency, which is directly responsible for the president carrying out governmental tasks in the field of technology assessment and application. AAAT is mandated to provide or produce innovative products. In the process of producing innovative products, assistance is needed starting from the idea stage to commercialization, to avoid ending the technology in the valley of technological death (Ford et al., 2007), which is a condition where an innovative product is not absorbed by the market or industry.

Competition in the global economy presents pressure to survive and compete. According to Chen et al. (2011), the commercialization of technology is a common strategy to compete in the global market. The process of technology commercialization is related to the presence of technology in a market and the stages of innovation distribution (Story et al., 2011). Commercialization of technology is an important process of an innovation process, which means that a technology and product cannot enter the market without going through a commercialization process (Frattini et al., 2012). According to Kristinawati and Aprianingsih (2015), and Kristinawati and Aprianingsih (2015), technology commercialization is defined as an activity to create business models to increase profits by providing value to customers through the development of products or services with special technology.

3. Methodology
The methodology of this study is described in Figure 1. In general, this research refers to the flow of PBL from Rafia Shabbir (2020). PBL provides an environment for developing technological entrepreneurship skills and delivering technopreneur education, equipping individuals to be prepared for a career as technopreneurs.

3.1 Identify the problem
The research in question focuses on learning activities conducted at AAAT and CEFEEST, both of which serve as hubs for startup development. This program specifically targets undergraduate students majoring in industrial engineering having an interest in entrepreneurship.

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3.2 Plan the project
PBL is expected to facilitate students’ ability to learn directly through the ILIC program so that students can understand, practice and provide solutions to various problems in the technology transfer process and answer the challenges of technology commercialization, particularly the stages of the innovation process and technology transfer (see Figure 2).

3.3 Schedule the PBL
The training material presented refers to the innovation process and technology transfer framework from the adoption research by Siyanbola et al. (2011). The detailed schedule distribution for one semester is described (see Figure 3).

Source(s): Author’s own creation
3.4 Monitor the progress

The current monitoring process employs an assessment rubric designed to align with predefined quality standards. This scoring rubric is primarily based on the Assessment Rubric of the National Standards for Entrepreneurship Education Practices established by the Entrepreneurship Education Consortium. Specifically, it focuses on evaluating the concept section related to fostering entrepreneurial thinking. To enhance the assessment process, the rubric has been integrated with the judgment rubric developed by Martínez et al. (2011). This integrated rubric comprises three main components: curriculum planning, reports and reporting.

The assessment rubric design is detailed in Table 1. PBL implementations are evaluated based on the extent to which they exhibit thorough, accurate and relevant processes and results. Scores are categorized as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Curriculum planning</td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Comprehensive curriculum delivery (20%)</td>
</tr>
<tr>
<td>A2</td>
<td>Basic technology-based entrepreneurship skills (20%)</td>
</tr>
<tr>
<td>A3</td>
<td>Economic impacts (20%)</td>
</tr>
<tr>
<td>A4</td>
<td>Personal interest and investment (20%)</td>
</tr>
<tr>
<td>A5</td>
<td>Risk management (20%)</td>
</tr>
<tr>
<td>B. Report</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Business planning design (35%)</td>
</tr>
<tr>
<td>B2</td>
<td>Technological analysis (30%)</td>
</tr>
<tr>
<td>B3</td>
<td>Writing format (15%)</td>
</tr>
<tr>
<td>B4</td>
<td>Graphics: figures, tables and formulas (10%)</td>
</tr>
<tr>
<td>C. Presentation</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Content (30%)</td>
</tr>
<tr>
<td>C2</td>
<td>Organization, development and vocabulary (40%)</td>
</tr>
<tr>
<td>C3</td>
<td>Visual aids to the presentation (30%)</td>
</tr>
</tbody>
</table>

| Table 1. Rubric assessment of PBL |

Source(s): Author’s own creation
3.5 Assessment

Based on the scoring matrix in the rubric, an assessment was made of the sustainability of PBL in both categories. The total score has been added up and multiplied by each resulting assessment weight. Each student should assess the ongoing learning process and assess the work of his friends according to the existing assessment rubric.

3.6 Evaluate the experience

The cumulative scores obtained serve as the foundation and input for assessing the implemented PBL process at both incubation centers. To analyze these scores, SPSS software is employed along with the paired $t$-test method. This statistical analysis method compares the overall scores between AAAT and CEfEEST for each assessment indicator, helping to identify any significant differences or similarities in the PBL process’s effectiveness between the two centers.

4. Results

4.1 Paired $t$-test result

The assessment results comparing AAAT and CEfEEST were subjected to evaluation using the paired $t$-test method to determine the significant differences between the two groups. A similar approach was taken in a study by Malmia et al. (2019), where they compared chemical values between class XI IMIA3 and class XI IMIA2 students using a paired sample $t$-test to ascertain the presence or absence of average differences between the two paired groups. Additionally, Kermaniyan et al. (2008) employed a paired $t$-test in their research to assess the significance of the PBL group when compared to the traditional group. These statistical methods help determine whether the observed differences are statistically significant.

Table 2 indicates that almost every indicator between CEfEEST and AAAT has a significant impact. However, pairs 4 and 10, which pertain to indicators A4 and C1, respectively, show no significant influence. Pair 4 compares A4 between CEfEEST and AAAT, focusing on personal interest and investment. The absence of a significant difference suggests that both centers provide extensive opportunities for students to learn and tackle problems that are personally meaningful and relevant to them, as well as within a significant context. The depth and breadth of the context are exceptionally broad and deep, as reflected in the high average score of 7, or a high scoring category for each student.

Pair 10 assesses the content of C1 in CEfEEST and AAAT. Again, there is no noticeable difference, indicating that both centers offer comprehensive and well-supported materials. The student presentations also provide valuable insights, with each student achieving an average score of 7 or a high scoring category. Since pairs 4 and 10 do not show significant differences, it suggests that the proposed PBL approach can utilize a mixed scenario that combines elements from both CEfEEST and AAAT. However, pairs 1–3, 5–9 and 11–12 call for further investigation.
for further research to determine whether the proposed PBL aligns more closely with the AAAT or CEfEEST scenarios. These indicators require additional investigation to assess which approach is more effective for specific aspects of the PBL implementation.

4.2 Design the alternative PBL for technopreneur education

A paired t-test revealed that ten markers have a significant influence. To create an alternative PBL for future technopreneur education, select the PBL implementation with the highest score from AAAT or CEfEEST. Figure 4 shows a comparison of key indicator evaluation results.

Create an alternative PBL using the CEfEEST scenario and indicators such as A2 (basic technology-based entrepreneurship skills), A3 (economic impacts), A5 (risk management) and B2 (technological analysis). Then, create an alternative PBL using AAAT scenarios such

![Figure 4. Comparison of indicator assessment results with significant effects](image-url)

**Note(s):** *If Sig. (2-tailed) < 0.05, the pairing has a significant effect
**If Sig. (2-tailed) > 0.05, the pairing has no significant effect

**Source(s):** Author’s own creation
as A1 (complete curriculum delivery), B1 (business planning design), B3 (writing format), B4 (graphics: figures, tables and formulae), C2 (organization, development and vocabulary) and C5 (visual aids to the presentation). Based on all of the stages completed, a comparative evaluation of the two existent scenarios, namely, the implementation of PBL in CEfEEST and AAAT, is performed (see Table 3).

Both situations produce good results in the technopreneur learning process, particularly in terms of recognizing the stages of the innovation process and technology transfer. The two PBL lessons produced equally good results with their unique benefits. As a result, the implementation of PBL for future learning can combine the benefits of the two existing scenarios in which curriculum preparation and technology analysis are presented in depth. As a result, it can generate understanding output from undergraduate students who participate in good reports and presentations.

4.3 Assess the alternative of PBL with a rubric
With an average score of 8, or a high category, the learning process at CEfEEST dominates the areas of basic technology-based entrepreneurship abilities (A2), economic impacts (A3) and risk management (A5). The majority of tenants at CEfEEST are those who use technology in the manufacturing process. Students will be able to go immediately to the production of a product, such as those involving chemical or electrical processes. Based on this, it is immediately capable of providing comprehensive, accurate and relevant basic technology-based entrepreneurship abilities. The real-world environment can demonstrate the value of entrepreneurial abilities, including components of personal interest and involvement in issue solution, as well as aspects of comprehensive risk management that can be comprehended best.

AAAT dominates the complete curriculum delivery (A1) feature, as represented by the number 8 or high category. With an intense enough time allocation, the learning process and curriculum are given thoroughly and maximally at AAAT. AAAT focuses on MSME

<table>
<thead>
<tr>
<th>Steps</th>
<th>Scenario 1 (CEfEEST)</th>
<th>Scenario 2 (AAAT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the Problem</td>
<td>CEfEEST, under the aegis of the university, assists in reducing the output of product research from universities so that it may successfully reach the market, in order to provide excellent technical innovation outputs</td>
<td>AAAT, under the aegis of the government, assists tenants in accelerating their superior goods in order to develop tenants with high-quality human resources</td>
</tr>
<tr>
<td>Project planning</td>
<td>Consists of ten persons separated into five groups and given various projects from tenants with existing technical breakthroughs, culminating in a final project from each group</td>
<td>Consisting of ten persons who play individual roles and are provided a material debriefing consisting of eight technopreneur-related training themes, case studies to existing tenants and a final project from each individual</td>
</tr>
<tr>
<td>Schedule Monitor the progress</td>
<td>1 Semester equivalent to 3 credits Assessment Rubric for National Standards of Practice for Entrepreneurship Education from the Consortium for Entrepreneurship Education, especially in the concept section of facilitating entrepreneurial thinking. The rubric is then integrated with the assessment rubric from Martinez et al. (2011)</td>
<td>1 Semester equals 21 credits</td>
</tr>
<tr>
<td>Assessment</td>
<td>Good in curriculum planning, lack of report and presentation, but still good in the technical analysis report</td>
<td>Good in curriculum planning, good in report and presentation, but lack of technology analysis</td>
</tr>
</tbody>
</table>

Source(s): Author’s own creation

Table 3. Design the existing PBL for technopreneur education
incubation in order to prepare unique goods that can be scaled up and compete with imported items. AAAT also prevails in areas such as business planning design (B1); writing format (B3); graphics: figures, tables and formulae (B4); organization, development and terminology (C2); and visual aids to the presentation (C5). The implementation of PBL in AAAT outperforms CEfEEST in the report (Code B) and presentation (Code C) aspects. The time given to complete the project is one of the most important elements influencing the difference in the quality of the ensuing report and presentation. The implementation of PBL in AAAT, which lasts one semester or the equivalent of 21 credits (1,050 min per week), differs significantly from the implementation of PBL in CEfEEST, which lasts only three credits (150 min per week). This is in line with Slavin’s research (Slavin, 1994), and the proper degree of instruction, reward and time are other factors that affect learning effectiveness in addition to the quality of education (learning outcomes). As a result of the restricted time allotted for PBL implementation at CEfEEST, the process of compiling the final project report, even down to the depth of the content presented during the presentation, suffered from a lack of quality.

Despite the fact that the outcomes of the report and presentation of the final project from the execution of AAAT were superior to CEfEEST due to a more optimal time allocation, the final project of CEfEEST retains its characteristics. This is evident in the technical analysis (B2) parts, which have a higher grade than the assessment in AAAT learning. This is consistent with the preceding debate, in which CEfEEST, which generates high-tech start-ups, gives students a very wide understanding of how the technology is ready, beginning with concept and development and ending with being able to be effectively sold in the market. So, implementing PBL in CEfEEST can provide knowledge about the technology-readiness level (TRL) more completely than PBL in AAAT. A measurement system called the TRL enables continuous comparisons between different technology types and the evaluation of the maturity of a given technology (Mankins, 1995). With the goal of this research, learning TRL is linear since TRL can be used to build a strategy to encourage faster technological commercialization. Furthermore, technical analysis at CEfEEST tends to be higher because the project is carried out in groups of two persons. Because it brings together two points of view, this results in a more comprehensive examination of technology.

4.4 Proposed PBL
Based on the results of the paired t-test analysis, the following PBL is proposed. To support better assessment findings, this suggested PBL that includes AAAT, CEfEEST and blended (a blend of AAAT and CEfEEST) scenarios. Better assessment outcomes seek to produce better technopreneurs in higher education, like in the case of Industrial Engineering Department students. As a result, it can help students who play a part in helping the process of technological transformation, so that students understand how to solve the commercialization problem (see Table 4).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed PBL scenario</td>
<td>AAAT</td>
<td>CEfEEST</td>
<td>CEfEEST</td>
<td>Blended</td>
<td>CEfEEST</td>
<td>AAAT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed PBL scenario</td>
<td>CEfEEST</td>
<td>AAAT</td>
<td>AAAT</td>
<td>Blended</td>
<td>AAAT</td>
<td>AAAT</td>
</tr>
</tbody>
</table>

Table 4. Proposed PBL scenario

Source(s): Author’s own creation
Indicators with codes B and C related to report writing and presentation, and the AAAT scenario dominates the indicator. Based on the previous analysis, producing a maximum report and presentation requires sufficient time. Thus, the proposed PBL consists of 1 semester equaling 21 credits. In addition, to support the maximum results of technological analysis (B2) based on the CEfEEST scenario, the proposed PBL will be divided into groups with 2 members and given different projects from tenants with existing technological innovations, and ends with a final project from each group. Figure 5 shows the proposed PBL scenario with the rubric assessment. But rubric indicators C1, C2 and C3 must master all the material taught from weeks 1 to 16 during learning.

Successful proposed PBL also requires top-down commitment from administration, and bottom-up encouragement from participating faculty and students (Wiek et al., 2014). This research is also in line with the research of Strachan et al. (2019) on the implementation of PBL at the University of Strathclyde, which has the potential to impact SDGs in target communities by linking research-based teaching and learning with community outreach. Implementation of PBL for technopreneur education is also in line with the research of Colwell (2011) that PBL is an effective means for companies to capture, retain and use knowledge. To exploit both explicit and tacit knowledge, companies can combine knowledge transfer with social learning mechanisms to increase the overall effectiveness of project-to-organizational learning. This is in line with the implementation of PBL in this study, which helps a start-up or business that is being incubated to be more effective in the commercial process and not fall into the valley of death. This PBL also had more impact than the traditional lecture in teaching to the students (Moubareck, 2022).

5. Conclusions and recommendations
ILIC is an Indonesian Ministry of Education, Culture, Research, and Technology program that allows students to study directly with an incubation center or technology transfer office (TTO). ILIC, which uses a PBL design, is a venue for Industrial Engineering undergraduate students to learn directly through technopreneur education. This PBL was developed and deployed in two TTO branches, AAAT and CEfEEST. The PBL stages of identifying, planning, scheduling, monitoring, assessing and evaluating the project are referred to as the

![Figure 5. Proposed PBL with rubric assessment](image-url)
learning design process. This study also created an assessment rubric as a foundation for comparing learning output, which was divided into three assessment sections: curriculum planning, report and presentation. According to the results, learning in the two TTOs has very good outcomes in delivering learning materials, particularly regarding the stages of the innovation process and the technology transfer process according to the specified curriculum. Both have advantages, with CEfEEST being superior in terms of technical analysis and AAAT being superior in terms of its incubation method. Thus, CEfEEST implementation is easier in producing learning processes, whereas AAAT implementation is easier in producing business start-ups. As a result, the proposed PBL can blend concepts from the two to maximize production. Lessons learned can be used not only by students, but also by new businesses. As a result, incorporating PBL into technopreneur education can help students completely understand how to effectively measure commercialization tactics using real-world case studies.

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Development of PBL on technopreneur education
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