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## Article

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RESEARCH

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# Project-based entrepreneurial learning (PBEL): a blended model for startup creations at higher education institutions

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## Abstract

This research aims to describe the dynamics of applying project-based entrepreneurial learning (PBEL) in creating startups at higher education institutions. Action research was used for eight participants as the research method by applying the PBEL model in the form of a narrative method. The results revealed that all university students can produce products, starting from prototypes until business products. The PBEL model drives successful startups. For the more effective startups, the PBEL model needs to add network marketing and funding to be applied. Future research is expected to address questions from the results of this study.

**Keywords:** Entrepreneurial learning model, Project-based learning, Startup, Narrative method

## Introduction

Entrepreneurial competence is formed constructively, so that the entrepreneurship learning that is appropriate with it is constructive learning, where the students are encouraged to make a concerted effort in the learning process. The ideas, attitudes, and expertise that are owned at this time/in the past can be used and trained to understand, make decisions, and complete tasks that are given to them. Educators function as mentors, instructors, and discussion partners when students experience problems. Nakayama et. al. (2021) stated that constructivism and the learning environment is one of the four key sets of factors that influence the learning process. Besides constructivism and the learning environment, there are three other factors which influence learning, which are the learner's attitude, literacy, and learning strategies.

Teachers must try to arrange a constructivism environment where students are encouraged to be involved in active dialog with other students and teachers and be in a real-world situation, which is a teaching location.

Many entrepreneurship learning models have been made and explained previously. However, as of now, there are no completely effective models applied at higher education institutions to make startups. Much entrepreneurship learning is still focused

on educators. Several educators have already applied constructive learning like project-based learning = PBL (Kean & Kwe, 2014) and the Entrepreneurial Learning Model = ELM (Santoso et al., 2021). Even though they have plus points, both models also have negative points.

Pretorius et. al. (2005) applied an integrated model, combining the Entrepreneurial Performance Education Model (E/P Model). Their model consists of motivation, entrepreneurial skill, and business skill components with the Entrepreneurial Education Model (E/E Model), which comprises entrepreneurial success themes, business knowledge and skills, business plan utilization, learning approaches, the facilitator, and the program context. This combined model is still not constructive and continuous as a process.

Dickfos et. al. (2014) stated that a blended learning approach that integrates theory and practice through a simulation aligns well with the needs of learners undertaking professional development. It is different from the blended entrepreneurial learning that has been proposed. This can be a future study to look for differences and the meeting point of these two things.

Based on this kind of a background, PBL and ELM can prospectively be developed to become entrepreneurship learning models, despite having weaknesses. The problem of this research is in how to describe the results of the implementation of the project-based entrepreneurship learning model (PBELM) which has been carried out for three years at Universitas Dhyana Pura Bali. The researcher will attempt to combine PBL and ELM to overcome the weaknesses of each model. ELM emphasizes the substance and form of learning, which will be combined with PBL which focuses on the learning activities or characteristics. This is the novelty, which previously had not been done.

This model was then tested at Universitas Dhyana Pura Bali (Undhira), Indonesia. In their learning, the students had to make business projects directly with the guidance of a successful entrepreneur mentor, but first they had to do job training at the mentor's workplace. The solutions for the work framework used a concept from Priyanto (2012), which comprised a change in mindset, entrepreneurial skills, business skills, and ready skills; and also from Santoso et. al. (2021), which was made up of entrepreneurial motivation, cognitive factors, business opportunities, and a supporting business environment. From this program, research was conducted about the dynamics of entrepreneurship education in higher education institutions and its effects on the growth of students' entrepreneurship spirit.

## **Literature review**

### **Entrepreneurship**

Entrepreneurship is proven as playing a significant role in several aspects. Dickfos et. al. (2014) stated that a blended learning approach that integrates theory and practice through a simulation aligns well with the needs of learners undertaking professional development. It is different from the blended entrepreneurial learning that has been proposed. This can be the next study to look for differences and the meeting point of these two things.

In the industrialization process, an entrepreneurship attitude is needed in economic development. A related study proposed that an individual's characteristics, basic

competencies, and special competencies like industry expertise and technique expertise, as well as motivation have a positive influence towards company growth. It was concluded that entrepreneurship elements like an internal locus of control, a need for achievement, extroversion, education experience, and self-reliance influence company growth (Van Laar et al., 2017).

Entrepreneurship is an introduction process, an idea creation, and the assembly of new resources (Volkman et al., 2021). The creation of something new, whether it is a product, market, method, raw materials, organization, or technology cannot be done instantly. Entrepreneurship is a long process starting from the dream stage, contemplation stage, to the construction stage. Several writers stated that entrepreneurship is identical with creativity, a need for achievement and risk taking, independence and an internal locus of control, and a proactive mindset (Duarte, 2011; Nielsen et al., 2021). Entrepreneurship is not only a problem of individual traits, but it is also one's ability to identify opportunities, develop ideas, and combine productive factors to be processed. The combination of these production factors is done for the first time before others carry it out.

Entrepreneurship has a strong relationship with things that are not arranged, are unexplained, and have high uncertainty due to being faced with a new situation. Meanwhile, the management scope has a condition which is opposite from that. Management will strive to make something which is unclear, uncertain, and disorganized become more organized and better. Entrepreneurship is an activity which is needed to create a new business (Kazmi & Nabradi, 2017). In contrast, management is an effort to arrange and run the new business (Malmström & Johansson, 2017).

If the development of entrepreneurship meanings or definitions are observed or heeded, it seems that entrepreneurship not only comprised personal education. As stated by Higgins (2017), entrepreneurship is the personal development of an individual to be able to have creativity, be innovative, be willing to try things, be independent, and have a desire to advance, which will enable the person to coordinate with other parties and develop the business. Nevertheless, entrepreneurship education reflectively produces participants who can assemble resources and run a business (Mueller & Anderson, 2014).

### **Entrepreneurial learning model (ELM)**

In entrepreneurship education, many models and concepts have been developed. In general, the Entrepreneurship Education Model contains several goals, such as changing one's viewpoint or mindset, altering the entrepreneurship expertise, enabling the ability to make a business plan, and facilitating the ability to communicate. The main point of all of these items is in how to prepare students to be able to capture opportunities and use these opportunities to become more valuable business activities.

One of the models that have been developed is the Entrepreneurial Learning Model (ELM). Entrepreneurship learning consists of three primary elements, which are personal and social emergence, contextual learning, and negotiated enterprise (Chang et al., 2021). Personal and social aspects cover personal and learning and development, the transition from pre-entrepreneurial to entrepreneurial action, opportunity recognition and selection, creating and starting business ventures, decision-making, risk spreading

and minimization, developing entrepreneurial managers and management teams, employee attraction and retention, market development, customer relationship development, innovation development, and managing growing businesses (Chang et al., 2021).

Entrepreneurship education contains group skills (self-starting skills—knowing how and where to look for opportunities; people skills—understanding human nature in an organizational setting; marketing skills—learning how to attract customers and sell themselves; money skills—managing assets of the business or organization; and leadership skills—making sound decisions in a timely manner under constraints. In contextual learning, Entrepreneurship Education comprised exposure to the business, hands-on experiences in the business, broadening experiences related to the business, formal entry into a business setting, and leadership opportunities in their careers. In the next step, Entrepreneurship Education consists of contemplating problems–solutions by exposing them first to the problem and then to choices of solutions in each skill set; meet and greet role models, go on business field trips, and show examples of other enterprising people; create networks to advisors, vendors, customers, and industry groups; as well as recap by supporting, encouraging, and engaging the individual; and recapping these experiences at every opportunity (Iannarelli & Mischel, 2008).

Entrepreneurial learning (EL) is not only related to individuals and groups, but it can be done through the role of mentors and organizations. Having a program with previous or current entrepreneurs as mentors to support and advise new entrepreneurs can become one of the entrepreneurship-learning methods. An approach which can be applied is lifecycle development in planning entrepreneurship development, the importance of learning two cycles, and learning from experiences or critical incidents. The kinds of “time appropriate training”, targeted training, and support given directly or facilitated by a mentor may be more cost effective in the long-term rather than a traditional training approach (St-Jean & Audet, 2012).

EL includes obtaining information retrieved from inside and outside the organization, learning from the experiences of other companies, collecting new and explicit data, and developing analytical and structural learning, which includes knowledge acquisition, information distribution and interpretation, organizational memory, and discussion and dialog within the company (Bonfanti et al., 2019).

It is undeniable that the ELM model can increase entrepreneurial intentions. However, this model has not been effective in increasing the number of start-ups and developing businesses. The ELM model needs to be considered by other models such as experiential training courses, trade exhibitions, and fairs (Bonfanti et al., 2019), including project-based learning (Shahiwala, 2017). ELM needs action learning like critical-action learning—which integrates critical theory and is intended to reveal the context-dependent impact on action learning activities and results; auto-action learning—which is based on the problem as perceived by the individual and a related fixed-question framework, e.g., “the 5 ‘whys’” developed by Toyota Production Systems; action learning coaching—which is based on “one-to-one” learning that resembles the apprenticeship approach; online action learning—which is based on standards to support reflection and learning regardless of the challenges experienced, e.g., EFQM for best practices; self-management action learning—which is based on the SME manager’s ability to facilitate individual learning and create personal and organizational development to enable innovation and

growth; and business-driven action learning—which is based on the business challenges of the business model and the organization. The business is the focal issue in this case (Brink & Madsen, 2015).

### **Project-based learning (PBL)**

The project-based learning (PBL) Model arranges learning around a project. A project contains complex tasks, based on challenging questions or problems, which involves students in the design, problem solving, decision-making, or investigation activities; provides students with the opportunity to work relatively independently for a long period of time; and ends with a realistic product or presentation (Leal Filho et al., 2016).

PBL has learning about authentic content, authentic evaluations, unguided teacher facilitation, explicit education goals as well as cooperative learning, reflection, and combining adult skills. It uses authentic questions (guiding), has an investigative community, and utilizes technology-based cognitive instruments and “expedition learning” which is comprehensive, community service based, and with a multidisciplinary theme (Recke & Perna, 2021).

PBL is a form of student-centered instruction that is based on three constructivist principles: learning is context-specific; learners are actively involved in the learning process; and they achieve their goals through social interactions and the sharing of experiences, knowledge, and understanding. It is a particular type of inquiry-based learning in which the learning context is provided through authentic questions and problems in real-world practice leading to a meaningful learning experience (Kokotsaki et al., 2016).

In the project-based learning process, students’ abilities can be improved by exploring ideas, reviewing possibilities, selecting topics and planning, producing and testing media, and presenting. With stages like this, the implementation of PBL can improve the performance of students who are studying business (Kongmanus, 2016). Although there are positive impacts, PBL also has negative impacts. However, it should be realized that PBL groups can be a stressor for students and can result in negative social interactions. Although students are involved through discussion and share knowledge and experiences, their interactions may not result in a successful project (Kongmanus, 2016).

The success of PBL depends on the absorption in the learning process and how the student sees the future after the project is completed. The different initial knowledge between the students when they are studying also affects their learning (Lin & Tsai, 2016). Therefore, this model needs to be complemented by other models, such as the entrepreneurial learning model.

### **Project-based entrepreneurial learning (PBEL)**

Equipped with an understanding of ELM and PBL, a new model can be constructed called the project-based entrepreneurial learning model (PBEL). From the previous literature construction and synthesis, there are three important items in entrepreneurship learning, which are the substance, form, and activities of learning as a learning process starts from the introduction process, reinforcement, and self-development (Nurbekova et al., 2020; Tasdemir & Gazo, 2020). After they are ready, the participants will be taught about recognizing opportunities and developing the ideas which will then be realized

in making a business proposal. After this, they will be asked to actualize their business plans in a real business.

The learning substance comprised several items like motivation and cognition (Shane et al., 2003), entrepreneurial skills, and business skills (Pretorius et al., 2005). The motivation material consists of a locus of control, a vision, a desire for independence, passion, a drive, goal setting, and self-efficacy. The cognition learning material has a vision, knowledge, skills, and ability. When learning about entrepreneurship, these two aspects are given as subjects.

The form of learning consists of education and training, experience, and mentoring (Santoso et al., 2021). In contrast, the learning activities are made up of undergoing the self-recognition process, knowing the environment and opportunities, developing ideas, and assembling resources (Shane et al., 2003). These three learning activities form a union of the PBL and ELM models, as seen in Table 1.

All of the entrepreneurship actions are a combination of the interaction results, an integration from the motivation and cognition results (van Burg et al., 2021) from students, social groups, and mentors. Shane et al., (2003) suggested that some or all of these motivations will influence the transition process in forming individual entrepreneurships from one stage to another stage. What is certain is that these motivational aspects form entrepreneurship. These motivational factors are combined with cognitive factors to influence one's entrepreneurship.

Entrepreneurship begins from an introduction to entrepreneurial opportunities and then is followed by developing the ideas to reach these opportunities, evaluate the feasibility, develop the products and services to fulfill consumers' needs, assemble the financial and human resources, design the organization, and target consumers (Kraus et al., 2018). When the students recognize opportunities and develop ideas, learning materials are needed about entrepreneurial skills. In the context of assembling resources, business skill materials are needed, beginning from designing the organization and human resources, developing the products, creating the market, financing the business, and operating the daily business activities.

To create new entrepreneurs, it is necessary to conduct entrepreneurship education that involves individuals, groups, communities, mentors, and organizations. By involving them, it increases cognition and motivation, provides opportunities for businesses,

**Table 1** ELM and project-based learning combined model

Learning substance	Form of learning	Project-based entrepreneurial learning (PBEL) Learning activities
Motivation Cognition Entrepreneurial skills Business skills	Education and training	Directed for developing self-competence based on the academic subject being taught Recognize opportunities Develop ideas Make business proposals
	Experience	Actualize business proposals and become startups in the students' respective fields
	Mentoring	Mentored by entrepreneurs who have operated businesses in the academic field that match with the students

Student, group, or social competencies; mentor; organization

Source: Elaboration model

and creates a conducive business environment; provides learning infrastructure by allotting management and business materials; as well as offers initial funding, market access, assistance in business management, and sustainability (Shane et al., 2003; Chang et al., 2021; Santoso et al., 2021).

### **Methodology**

Thomas (2000) stated that research about project-based learning can take several forms like depicting the level of success which is related to the implementation or application, the role of the students' characteristics in the effectiveness or appropriateness of PBL, and the testing of several features which are suggested or modified in project-based learning (intervention research). Meanwhile, ELM which uses an action research approach can use a data analysis with the narrative method that was suggested by Ray (2005), Chapus and Nordman (2021), and Dawson and Hjorth (2012) in explaining entrepreneurship learning.

### **Type of research and methodology**

The research methodology utilized an action research method. A development study is a kind of research where the study already has a conceptual model that has been obtained from previous theories and research results. Then to obtain reliability from the conceptual model, it is developed to become an operational model after obtaining validation from several experts (Koshy, 2005).

This study applied a 4D approach, meaning define, design, develop, and disseminate (Madeira et al., 2011; Richey & Klein et al., 2014; Setiawan and Wijaya, 2022; Thiagarajan et al., 1974). The research began by exploring the recent condition of entrepreneurship learning at higher education institutions, especially in PBL and ELM, as well as describing the startup needs. Then a combination model was designed between PBL and ELM, which was called the PBEL model. It was continued with a trial test and a validity test of the PBEL model. After that, dissemination was done to the stakeholders of a higher education institution. The research trial location was at Universitas Dhyana Pura Bali, Indonesia, which most precisely has an Entrepreneurship Education Program from the Ministry of Research and Technology.

### **Participants and informants**

The terms 'participants' and 'informants' are usually used in collecting qualitative data. The researcher and resource persons here have the same positions, and the resource persons are not just respondents who are asked to respond to questions by the researcher, but the researcher can choose the direction and method in providing the information that the researcher has. The participants of this activity are tenants, while the informants come from the higher education institution management, the program management, and the Entrepreneurship Education Program instructors.

### **Research project**

In this research, there were several research subjects (variables) explored and described in detail related to applying the PBEL model, which were entrepreneurial intention, startup company traits, business performance, output, and entrepreneurial learning.

In the initial stage, 100 individuals were involved. They were filtered into 16 business proposals, and they had to present their business ideas. Then eight students were chosen individually (two) and in groups (six) to be given entrepreneurship stimulus funds and business mentoring to develop their business projects according to the business ideas that they made after being advised by their mentors. The program was operational beginning in April 2019 and ended in December 2021. In 2019, 2020, and 2021, there were 9, 11, and 23 tenants who participated in the program, respectively, and 8, 8, and 11 tenants successfully completed their businesses. The participants taken in this research were those who had successfully completed their businesses for at least 6 months.

To depict the students' entrepreneurial characteristics and intentions, interview protocols were used such as the dimensions with their indicators, as viewed in Table 2.

To do an evaluation, the students were asked to answer each of the questions by giving a score of 1 until 7 as appropriate. From each of the dimensions, the scores were totaled to provide a picture of the students' (tenants') entrepreneurial characteristics and intentions.

#### Data sources

The data in this research were qualitative and quantitative data that originated from primary data and were in the form of trial tests, interviews, surveys, and observations; as well as secondary data from a literature study and documentation. The data sources were the subjects from whom the data were obtained. To facilitate in identifying the data sources, the researcher classified the data sources used in this research into three types:

1. *Person*, meaning the students, instructors, and mentors.
2. *Paper*, meaning the literature study and documents which were related to Entrepreneurship Education.

**Table 2** Dimensions and indicators as research interview protocols

Dimension	Indicator
Knowledge integration	<ul style="list-style-type: none"> <li>✓ I am able to do OIM (observe, imitate, and modify quickly of another's idea)</li> <li>✓ I feel that my business idea is unique and very different from the existing idea (own idea)</li> <li>✓ I am able to develop a new business idea from my existing business idea. (advance my own idea)</li> </ul>
Project ability (reflective)	<ul style="list-style-type: none"> <li>✓ I am able to create a business plan as the expected target</li> <li>✓ I am able to objectify my business plan</li> <li>✓ I am able to find solutions to my project problems</li> </ul>
Self-efficacy	<ul style="list-style-type: none"> <li>✓ I am more interested in doing easy and simple projects (magnitude)</li> <li>✓ I have ever felt frustrated in finishing my tasks</li> <li>✓ I face difficulties when I have to do projects out of my ability</li> </ul>
Entrepreneurial intention	<ul style="list-style-type: none"> <li>✓ I want to launch a new venture company of my own before graduation</li> <li>✓ I am more interested in establishing my own venture company than getting a job</li> <li>✓ I think that founding a new venture company is the only way to succeed in life</li> <li>✓ I would dedicate my life to establishing a new venture company even if my parents were strongly against it</li> <li>✓ Even if I launch new ventures and fail many times, I will keep on trying until I succeed</li> </ul>
Lee et al. (2021)	

3. *Place*, meaning the research location at Universitas Dhyana Pura Bali.

#### **Data retrieval technique**

The data were retrieved by using an observation method, a trial test, completing data through Google Forms, and discussions. Besides the learning activity data, the tenant business data were also collected. The data from the various sources above were reduced and then categorized. Next, themes were made before the meanings were found from each of the themes that were made previously.

#### **Data validity criteria**

The criteria to ensure the validity/truth of the research results included: the truth value was conducted by doing reflexivity and a reflection on one's own perspectives, the representativeness of the findings in relation to the phenomena; the consistency/neutrality through an auditability achieving activity; and applicability by doing an evaluation of the application of the findings to other contexts (Noble & Smith, 2015).

#### **Analysis technique**

An analysis technique was done by using a goodness of fit model qualitatively (Delphi) by paying attention to the appropriateness aspect in its application and a qualitative-constructive method to see the effects of applying the model, whether for management or the performance of each business actor. To explain the dynamics of implementing PBEL learning, a narrative analysis is used for both qualitative and quantitative data (Chapus & Nordman, 2021; Dawson & Hjorth, 2012).

### **Results and discussion**

#### **Descriptive narration and tenant results**

This study used an action research approach where in the analysis, a narrative data analysis method was utilized in delivering the Entrepreneurship Education Program. The results of the research which were related to the tenant business profile can be described narratively related to a description of the participants' entrepreneurship development program as follows (Tables 3, 4, and 5).

Tenant 7 and tenant 8 received the highest score of 48 in the entrepreneurial characteristic aspect (Table 3) and entrepreneurial intention (Table 4) as being higher than the other tenants. Interestingly, these two tenants already have running businesses, while the other ones are still making their prototypes and products (Table 5). This means that tenants with high entrepreneurial characteristics and entrepreneurial intentions are more related to competency in doing startups and operating their businesses.

#### **Group or independent learning?**

In various learning, the participants were given group tasks or individual tasks. In PBL, it is more emphasized in the group, while ELM is focused on the individual. In learning PBEL at Undhira Bali, the students are free to choose groups with anyone.

There are no limitations of religion, ethnic group, gender, region of origin, or study program. They can even choose members from other higher education institutions or

**Table 3** Student characteristics

Tenant number/ year	Knowledge integration			Project ability (reflective)			Self-efficacy			Total Score
	Other ideas	Own idea	Advance one's own idea	Create a business plan	Objectify a business plan	Find solutions	Big	Resistance	Area	
2019										
1	4	5	4	4	4	4	3	4	4	36
2	6	5	4	5	5	6	2	1	1	35
3	6	6	5	5	5	5	4	5	6	47
4	4	5	4	4	4	6	3	2	3	36
5	6	4	5	7	6	5	3	2	3	41
6	7	7	7	7	7	7	1	1	1	45
7	7	7	7	6	6	6	2	4	3	48
8	7	7	7	7	7	7	2	2	2	48
2020										
1	5	5	5	4	4	4	3	4	4	38
2	6	5	5	4	5	6	4	2	2	39
3	6	6	5	6	5	5	4	5	6	48
4	6	5	6	5	5	6	3	4	3	43
5	6	4	5	4	4	5	3	2	3	36
6	7	6	7	7	6	7	3	3	4	50
7	5	5	5	4	5	5	3	3	3	38
8	7	7	7	7	7	7	4	3	3	52
2021										
1	7	7	7	6	6	6	2	4	3	48
2	6	5	4	5	5	6	2	2	2	37
3	5	5	4	5	5	5	2	2	2	35
4	7	7	7	6	6	6	2	4	3	48
5	6	5	4	5	5	5	2	1	2	35

**Table 3** (continued)

Tenant number/ year	Knowledge integration			Project ability (reflective)			Self-efficacy			Total Score
	Other ideas	Own idea	Advance one's own idea	Create a business plan	Objectify a business plan	Find solutions	Big	Resistance	Area	
6	4	5	4	5	4	6	3	2	3	36
7	7	6	7	6	6	6	3	4	3	48
8	7	7	6	7	7	7	2	3	2	48
9	7	6	7	6	7	7	2	3	3	48
10	7	7	7	6	6	6	2	4	3	48
11	6	5	4	5	5	6	2	1	1	35

**Table 4** Entrepreneurial intention

Tenant number/ year	Intention and desire for venture creation					Total score
	To launch a new venture company of my own before graduation	Interested in establishing a venture company rather than get a job	Founding a new venture company is the only way to succeed in life	Dedication to establishing a new venture company	Keep on trying until I succeed	
2019						
1	4	4	4	4	4	20
2	7	6	5	6	7	31
3	4	4	4	5	5	22
4	6	5	5	6	6	28
5	3	4	4	4	5	20
6	6	6	5	6	7	30
7	7	7	6	6	6	32
8	7	7	7	7	7	35
2020						
1	5	4	5	4	5	23
2	5	6	5	6	5	27
3	6	7	6	5	7	31
4	6	7	6	6	6	31
5	5	7	6	7	7	32
6	7	7	7	7	7	35
7	5	7	6	5	5	28
8	7	7	7	7	7	35
2021						
1	7	7	7	7	7	35
2	7	7	6	6	6	32
3	6	6	5	6	7	30
4	7	7	7	7	7	35
5	3	4	4	4	5	20
6	5	5	5	6	7	28
7	7	7	6	6	6	32
8	7	6	7	6	7	33
9	7	7	7	7	7	35
10	7	7	6	6	6	32
11	3	4	4	4	5	20

other parties. The participants can also operate their own businesses themselves. They can also determine what kinds of businesses they want to run. Groups or individuals are not treated differently in this action research.

Interestingly, from the reflective test results, it showed that the startups which were successful in running their businesses had been operating for more than 6 months for a banana pizza business and a chicken farming business. They were both run individually. Then for the six businesses that were done in groups, they had not yet become businesses. Only one activity produced a concept and six activities produced products.

Entrepreneurial learning is an individual experience not a group experience. The groups are only learning media. When they study individually, the responsibilities fall to themselves, but for those in groups, they have expectations for each other and have to

**Table 5** Description and results of the tenants

No.	Tenant	Major study	Product item	Product output	Impact	Sustainability
2019						
1	Group	Physiotherapy	Mobile-based physiotherapy home care application	Prototype	Improving skill	The mobile-based business isn't ready yet. The application is still being built and revised
2	Group	Physiotherapy	Natural, healthy, and clean cosmetic, innovation jackfruit leaf body scrub	Model	Improving skill	The product is ready but it hasn't been marketed continuously and commercially
3	Group	Physiotherapy	"Mask Damba", neem, leaf mask	Model	Improving skill	The product has not been marketed. It has experienced difficulties in raw materials and the market
4	Group	Physiotherapy	Mayusi cloth	Model	Improving skill	The product is available but hasn't been marketed
5	Group	Physiotherapy	"Physio Care", Aromatherapy, rubbing oil	Product	Initial product	It is a startup and prospective product. It is difficult to create a new market
6	Group	Physiotherapy	"AnRe" ankle rehabilitation shoes	Product	Initial product	The product is ready. It needs a special market
7	Individual	Psychology	Banana Pizza (Pizzang)	Business	Profit, market and product development	It is a startup. He has been serving consumers through online media. The business has been running for more than 6 months
8	Individual	Management	Technology-based duck egg hatching	Business	Profit, market & technology development	It is a startup. He is trying to meet the high demand. The business has been running for more than 6 months
2020						
1	Group	Biology	Body lotion	Prototype	Improving skill	The mobile-based business isn't ready yet. The application is still being built and revised
2	Group	Physiotherapy	Corset "chef" Foot	Model	Improving skill	This product is good, but it doesn't have a market yet
3	Group	Accounting	Santuy Thai tea	Tea drink	Improving skill	This product is very popular, a contemporary drink that young people like
4	Individual	3-year Digital Marketing Diploma	Entrepreneur	Model	Improving skill	Online sales are very growing

**Table 5** (continued)

No.	Tenant	Major study	Product item	Product output	Impact	Sustainability
5	Group	Physiotherapy	Lazara oil	Product	Initial product	Oil is good but needs more in-depth testing to be able to be sold in the wider market
6	Group	Biology	P-Lipur Haira	Product	Initial product	This product is made from kitchen waste and is used as liquid fertilizer. This is very helpful for the farmer community because this fertilizer is very good for plants. Kitchen waste is also obtained from the community
7	Group	Physiotherapy	W-Imun tea	Business	Profit; market and product development	This product is very good because it is made from herbal ingredients, but because it was difficult to get a permit, the production stopped after 3 months
8	Individual	Physiotherapy	Recycled paper	Business	Profit; market and technology development	This business is running until now. There are many orders for invitation cards and bags made of recycled paper. The benefits are felt
2021						
1	Group	Accounting	Lantana coffee (Robusta coffee)	Business	Profit; market and product development	Until now, this business is still running with 10 kg of coffee bought from farmers. Then it is dried and mashed and put in attractive packaging. Every 3 days, 10 kg of raw coffee beans are used and it is very profitable
2	Group	Accounting	B.E.D.A FRAME	Business	Profit; market and product development	This business is currently running and every month new models are made by order
3	Individual	Management	Miniature Bonsai	Business	Profit; market, organization and product development	This business is still running, but the sales are not too many. The way to succeed is to make bonsai innovations not only from plants, but also other models made from leftover wire

**Table 5** (continued)

No.	Tenant	Major study	Product item	Product output	Impact	Sustainability
4	Group	3-year Marketing Management Diploma	Amrita pure honey	Business	Profit; market and product development	The honey is obtained from the Sulawesi area and packaged in smaller units and sold in Bali. This honey is selling very well
5	Group	Physiotherapy	Stadiga candle aromatherapy	Product	Initial product	This product is sold among acquaintances, but it has not been sold to the general public yet because it has not been tested
6	Group	Accounting	Krumpula	Product	Profit; market and product development	This product comes from the abundant availability of seaweed in Lembongan village. The diversification of seaweed is not only for sale, but also processed into crackers, jams, etc. Until now, it is still being sold but due to busy class studies, it is still not possible to produce large quantities
7	Group	PKK	Starfruit jam	Product	Profit; market and product development	This business is still running and the business not only makes cakes, but other snacks that are made from processed starfruit. It is also made into jam
8	Individual	Accounting	Frame room	Product	Profit; market and product development	This business is currently running and there is a diversification of products by using leftover cloth, as well as keychains for souvenirs
9	Group	Creative products and entrepreneurship	Moringa healthy cookies	Product	Profit; market and product development	This cake product made from Moringa leaves is still in production. Cakes made from Moringa leaves are often ordered before the holidays
10	Group	Accounting	Megi Chib and Megi Frozen: processed from catfish basic ingredients	Product	Profit; market and product development	These catfish processed products besides selling catfish, it also sells processed catfish crackers, and until now it is still running
11	Individual	Early childhood education	Puzaka	Model	Improving skill	This product cannot be sold yet, but from the concept, this product is actually a tool to encourage children to be able to listen to stories

wait for each other, so they are not independent. Group motivation is difficult to be integrated. When working individually, a person will feel greater risks. That creative process originates from individual contemplation, so that when in a group, there are members who have difficulty in understanding the creative process. The learning experiences are participative, interactive, and applied. This allows contact with the environment and the description process which is various and uncertain. This involves all individuals; learning occurs in affective, behavioral, and cognitive dimensions. This condition is difficult to be achieved in group learning, because the involvement intention is various (Agbim et al., 2013; Gentry, 1990).

### **Study program expertise-based learning**

From the reflective recapitulation of the entrepreneurial learning results, it shows that study program-based learning is more effective in producing products. The knowledge that they acquire is tacit knowledge which can become an embryo in starting a business (Dohse & Walter, 2012; Audretsch & Aldridge, 2009).

Tenants who come from the Physiotherapy Study Program can more easily create business ideas that originate from the knowledge they acquire on a daily basis. Nevertheless, there is one tenant who comes from the Psychology Study Program who succeeded to develop a food business. This signifies that study programs with specific characteristics can more easily produce products that are specific and unique, not just food businesses, as almost every study program can produce it. In a traditional entrepreneurial learning context, this finding is correct and supports the development of business expertise. However, in a modern viewpoint, learning is directed to build enterprises not businesses, so that actually any study program should be able to build enterprises (Axelsson & Westerberg, 2018).

### **Learning effects**

Tenant 1 succeeded to develop a mobile-based physiotherapy homecare application prototype. This tenant's development was based on improving society's health issues, especially related to bone or stroke problems. The purpose of this business is to provide service to society quickly by taking advantage of technological developments. This business has great opportunities to develop in the market because it has several superiorities which focus on the market segment and business planning as a reference in operating a mobile-based business. However, up until this research was conducted, the application was not actualized. An effort is needed to finish the application and turn it into a business.

The second tenant succeeded to develop the Body Scrub Daun Nangka (jackfruit leaf) (Unang) natural, healthy, and clean cosmetic innovation product. The UNANG body scrub product is a business innovation that is made with natural ingredients, so that it is appropriate to be used for various skin types and is supported with a modern appearance. The product from this company is not a new business product being marketed, but the uniqueness of this product is that this business has great market potential to be developed in the market. However, this product has not been marketed widely. It has only been marketed to friends.

Tenant 3 produced Masker Daun Mimba (neem tree leaf masks). This idea surfaced in response to the problems that are experienced by society and especially for teenagers. However, this product has not been marketed as a business activity; it has just produced a product.

Tenant 4 produced the product “Physio Care” aromatherapy rubbing oil. There is a great need for rubbing oil. However, the strong smell of the aroma and the old-fashioned bottle design make the image of rubbing oil less appealing for teenagers. So, a creative business innovation was made with a combination of fragrant essential oils with a mixture of rubbing oils like *gandapura* oil, clove oil, eucalyptus oil, and olive oil to make a fragrant rubbing oil. Besides that, with the innovation of a roll-on bottle, it can beautify one’s appearance from the rubbing oil, so that it is more interesting and appropriate with today’s developments. The product has not been marketed. It needs proper marketing, a good marketing strategy, and affordable prices for society.

Tenant 5 has produced a “Physio Care” aromatherapy rubbing oil business plan. Nevertheless, this product has not been marketed. They have an obstacle in producing a large quantity of the product and marketing it.

Tenant 6 produced the “AnRe” ankle rehabilitation shoe model. This idea is a solution for those suffering from leg injuries. Ankle injuries are often experienced by athletes or those who are engaging in sports activities. Ankles must be protected to avoid having injuries. If an injury still occurs, then something must be done immediately to treat the injury in the ankle joints. Making a health equipment business innovation like “AnRe Shoes” will facilitate an individual to treat an injury without using a lot of equipment. This product has not been marketed and needs partnerships with orthopedic hospitals because it is still a special market (niche market).

Tenant 7 succeeded to develop a banana pizza business (Pizzang). This business has been operating for more than 6 months and has already established a market and obtained a profit. Pizzang is a snack food product and healthy with natural ingredients in the form of bananas. In order that the taste is more enjoyable and can be accepted by youths, eight flavor variants have been added as well as eight toppings that are liked by youngsters. This product is sold in a partnership with Ojek Online (motorcycle taxi) (*Ojol*), in order to reach a wider market and has mini outlets in Bali city centers. Pizzang, which was established on 25 February 2018, is a business which provides natural ingredient snacks made from bananas that are packaged with a modern concept that is different from the competitors.

Tenant 8 has produced a duck egg hatching technology-based product. It has been run as a business for more than 6 months and obtained a profit. The production technology will be developed because the market is still wide open.

The things mentioned above are an illustration of entrepreneurship learning for students in year 1 (2019) of the program implementation. Various dynamics continued to happen to them. There were those who continued to run their businesses, but there were also some who switched their type of business according to the conditions of the business environment.

In the second year (2020), there were 11 students who passed the funding and participated in the program, but there were only 8 tenants who managed to continue the program. The development of their businesses can be seen in Table 5. Of the 8 tenants, there

was one tenant who stood out in the business, namely tenant number 8 in the 2020 program. The business developed was recycled paper. This business started when one of the students joined an association in his village, and they discussed together about making a business, and this started with the announcement of our program to find new startups in the student environment. The idea was conveyed to a youth group in his village. Finally they decided to make this venture. It turned out that this effort had also previously been made by one of the group's members, but it stopped. With the presence of students and the PPK program, it made them revive this business again. Through the help of equipment such as blenders, funds for operations, and also tools for pulp pressing, this business has been running until now.

This group also participated in another program, where the university started community service in Carut Village, which is a coffee-producing area. It turns out that from coffee processing a lot of material was wasted. These students then took the initiative to mix recycled paper with coffee peels to make the products more unique.

The business in the third year (2021) that was successful was the Robusta coffee business. This business idea originated from the area of origin of one of the students in the Pupuan Bali area as a producer of Robusta coffee. They then tried to develop it by making coffee. The local people sold coffee in the form of beans and some also sold the coffee in whole. This student then had the idea to buy from coffee farmers and then dried it and made coffee grounds. The first sale was in the traditional form wrapped in plastic only. The sales were only for households and it was placed in food stalls.

In the process, after being mentored, the coffee sales were not only wrapped in plastic for households, but also packaged. The final products were wrapped in attractive packaging so that the sales were not only for household needs, but this coffee was also bought for souvenirs if there were religious activities (e.g., marriage ceremonies or other events). On average, 10 kg was sold and ran out in 2–3 days. If there were many ceremonies, then even more than 10 kg could be sold.

In addition to improving students' knowledge and business skills, this program also had an impact on changes in student motivation. They began to enjoy the business being run. They also began to be resilient considering the many problems that arose and had to be resolved. In addition, the ability to see opportunities and develop ideas has also increased, as can be seen from the type of business being built. The ability to assemble resources also increased because they were initially limited in some ways. After learning more about the business, they were able to identify and find the supply chain and value chain of the business they were running. In this case, they also learned to work together and synergize to develop their business.

### **Dynamics in applying PBEL**

In improving entrepreneurial competence in order that the participants (students) can create and develop their businesses, there are several learning methods that can be done like education and training (Porfírio et al., 2022), trying directly (Santoso et al., 2021), and mentoring, as well as all three can be applied (Utomo et al., 2019). Despite this, when implemented in an input–process–output dimension, there are several models like project-based learning (Radianto, 2013), competence-based learning (Vries et al., 2022),

game-based learning (La Guardia et al., 2014), and problem-based learning (Rodríguez et al., 2022).

Based on the marketing of the learning models above, the combination of the two methods has not been applied. This research attempted to combine an entrepreneurial learning model approach in the form of training and education, experience, and mentoring in one package with project-based learning. The university students were given education and entrepreneurship training by joining a structured Entrepreneurship Education course and unstructured entrepreneurship training, trying directly by making business proposals and starting businesses as well as being assisted by mentors who have had previous experience as entrepreneurs to develop a real business project (not a prototype).

In implementing this model, the participants received material and learning methods as depicted in Table 1. Every student took the Entrepreneurship Education course. After that, they received entrepreneurship training that was specialized to open their business insights and improve their motivations. After they were motivated, they were guided by mentors to make business ideas that ended in them making business plans. The feasible business plans were given a financial stimulus to actualize their business plans with the guidance of mentors.

This combined model is one of the models expected to be able to produce startup businesses based on the required knowledge. This combination facilitates the students to be able to visualize what they want and aspire in the form of a real business model. Entrepreneurship learning can become one package, not separated, so that it enables students to realize their ideas more easily from a conventional approach in entrepreneurship learning.

In spite of this, in its implementation, the ELM model combined with the PBL model has weaknesses, such as knowledge, perception, and orientation differences in doing business. Besides the problem of actualizing students' business ideas in a written form, having only one seminar and the Entrepreneurship Education course that is taught by the lecturer who does not have a mentor capacity are also constraints in motivating students to write their business plans.

When their business plans were arranged and they tried to implement them, they generally were stalled in the goods production stage. When they wanted to market the products, they experienced difficulties. This means that this combined model also necessitates an arranged business plan. Besides being based on knowledge competence, it also has to be based on the market and investments. When it is based on production and knowledge competence, they will be stalled in developing their businesses.

### **Conclusion and suggestions for further research**

The dynamic of implementing PBEL at Undhira by emphasizing the three aspects of training and education, experience, and mentoring shows that students' entrepreneurship performance is greatly related to educators and mentors, students, and the learning methods implemented. Through action research, by applying the PBEL model from the program socialization stage, an entrepreneurship seminar that ends with an entrepreneurship potential test, business idea selection, proposal selection, grant provision, business implementation, and participation in an entrepreneur

community, it shows that students who have backgrounds with parents as entrepreneurs will have a high intention to do a startup business, be in a business field that matches with a more successful academic discipline rather than a different one, and have a business that matches with their hobbies and prospects for a startup business. Leadership, entrepreneurship, and managerial abilities are also determinant factors in the success of a startup business.

The novelty of this article is in the construction and application of the project-based entrepreneurial learning (PBEL) model in creating a startup business, which begins from an explanation about the formula, implementation, and evaluation of its effects. However, how the model details and measurements can be applied in another location has not been done. In its implementation, this model has a weakness when it is not accompanied with marketing and business orientations. Therefore, in the future this model also needs to be implemented by adding these two orientations. Besides that, for future research, the entrepreneurship process of startups needs to be examined more in-depth to recognize opportunities to create ideas, start and develop businesses, as well as explain in-depth about the program effects towards the development of students' competencies and entrepreneurial spirit, including in how it affects their academic abilities.

This research has several implications. For policy-makers both in the government and in universities, the results of this research can be used as a policy strategy for developing entrepreneurship learning which has so far emphasized on increasing production skills or developing businesses only. Entrepreneurship learning needs to be equipped with learning substance education such as motivation, cognitive abilities, entrepreneurial skills, and business skills. There are three forms of learning, namely education and training, direct testing, and mentoring. Learning activities consist of strengthening cognitive capacities and capabilities, recognizing opportunities, developing ideas, and assembling resources. For entrepreneurs, the results of this research are expected to provide input on the entrepreneurial learning model of entrepreneurs related to increasing their motivation and self-knowledge, participating in training, trying directly, and participating in an entrepreneur community or as mentors, not just learning to increase production and management. Efforts to identify opportunities and develop realistic and rational ideas need to be made to get a viable business. Trying to start a business (project) is a means to increase entrepreneurship by continuously improving self-knowledge and competence, management, and business, making it possible to achieve business success.

#### Abbreviations

PBL	Project-based learning
PBEL	Project-based entrepreneurial learning
E/P Model	Performance Education Model
(E/E Model)	Entrepreneurial Education Model
ELM	Entrepreneurial Learning Model
OIM	Observe, Imitate, Modification
SMEs	Small and medium enterprises
4D	Define, Design, Develop, and Disseminate

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#### Author contributions

Each author has made substantial contributions to the conception and design of the work; the acquisition, analysis, and interpretation of data; the creation of new software used in the work; and the drafting and revision of the work. All authors read and approved the final manuscript.

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### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

### Declarations

#### Competing interests

The authors declare that they have no competing interests.

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