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Empowering Science-Based Entrepreneurship (SciPreneur) Skills through CEL-BaDiS Up Learning Model on Food Biotechnology Materials

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Entrepreneurship skills are part of the essential skills in facing 21st-century challenges and demands. Therefore, this study aims to analyze the extent to which the empowerment of the creative entrepreneurship learning-based discovery skills (CEL-BaDiS Up) learning model can improve university students' science-based entrepreneurship (SciPreneur) skills on the topic of food biotechnology. This quasi-experimental research study employed a pretest-posttest control group design at a public university in Surakarta, Indonesia, in the 2020/2021 academic year, in which one class was as an experimental class using the CEL-BaDiS Up model, while the other class was an existing class utilizing a project-based learning (PjBL) model. Data were obtained through test instruments in the form of a performance assessment to measure SciPreneur skills, which had gone through expert validation, encompassing validation from education and evaluation experts, biotechnology experts, and certified natural science lecturers, and empirical validation tests had also been carried out. The results revealed that the effectiveness test score utilizing SEM from PLS software showed the effect of CEL-BaDiS Up (X1) on the SciPreneur skills (Y) variable of 2.105 > T-table (1.976). In addition, the original sample estimate value exhibited a positive value of 0.199, signifying the direction of the relationship between the CEL-BaDiS Up (X1) variable and the SciPreneur Skills (Y) variable was positive. Based on this study's results, it could be denoted that SciPreneur skills in the aspects of critical thinking skills, problem-solving skills, communication skills, collaborative skills, observational skills, and creativity and innovation could be improved effectively through the CEL-BaDiS Up model activities.

Keywords: SciPreneur skills, CEL-BaDiS Up, biotechnology, entrepreneurship skills, learning model

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INTRODUCTION

21st-century skills have become a topic widely discussed in recent times. Many organizations and researchers have formulated what is included in 21st-century skills, starting from the 4Cs consisting of critical thinking, creative thinking, problem-solving, collaboration, and communication (Hunaidah et al., 2018; NEA, 2007; Oktariani et al., 2020; Sugiyarti et al., 2018), which later developed into 5C comprising critical thinking, communication, collaboration, creativity, and celebration (Chinien & Singh, 2009; Lucas et al., 2012; Wagner, 2010). Even until it became 6C, covering collaboration, creativity, communication, critical thinking, compassion, and computational logic. Furthermore, education is becoming increasingly important in the twenty-first century to guarantee that students have job and life skills, information media and technology skills, and learning and innovation skills (Partnership for 21st Century learning, 2015). These various skills can then be empowered to students, in this case, university students, by means of becoming the primary goal in learning and the learning process (Djudin, 2020). Based on the previous research results, critical thinking skills, leadership, communication, collaboration, productivity and accountability, adaptability, innovation, information, global citizenship, entrepreneurial skills and spirit, and accessing, analyzing, and synthesizing are some of the survival skills and competencies that students will need to deal with life, the job, and citizenship in the twenty-first century, according to experts (Wagner, 2008).

Furthermore, the importance of entrepreneurship is currently studied by many experts (Kyari, 2020; Linton & Klinton, 2019). It has been pointed out that empowering entrepreneurs can start from childhood, which is crucial. In addition, one of the driving characteristics of boosting the economy of a country is the large or small number of entrepreneurs (Hasan et al., 2017; Mahmood et al., 2021). For this reason, students can be introduced to new business opportunities in the world and need to be taught independence, dare to take risks, and practice making their own decisions; thus, when entering college, that desire can be empowered more strongly through entrepreneurial learning in college (Kadir et al., 2012; Kyari, 2020). Moreover, entrepreneurship is also essential for the socio-economic landscape because it has the potential to influence one's ability to become an entrepreneur by arming them with the necessary tools and changing their mindset (Bharucha, 2019; Tedjakusuma et al., 2019). Entrepreneurship is an important skill to develop in the 21st century to develop economic conditions. Educators are expected to identify today's economic difficulties and possibilities and guarantee that students get the required "21st-century" knowledge, abilities, and skills, one of which is entrepreneurship (Boyles, 2012). There are ten advantages or benefits of learning entrepreneurship skills: 1) opening and expanding new jobs for others; 2) improving community life welfare; 3) improving entrepreneurial spirit; 4) increasing creativity; 5) developing innovation; 6) practicing discipline; 7) practicing responsibility; 8) having an honest nature; 9) training children to become more independent; 10) having a high commitment and competitive spirit. Hence, as a catalyst, entrepreneurship education is necessary for focusing on growth in accordance with a country's entrepreneurial culture. As a result, attempts to promote entrepreneurship education must be continued and enhanced for the younger generation to support the present industrial revolution 4.0 trend (Mahmood et al., 2021).

Recent studies have uncovered that entrepreneurship contributes to youth empowerment (Adegun, 2013), rural development (Aslam et al., 2012; Paul1 & Sharma, 2013), regional development and economic growth (Chanhming, 2008), and women's empowerment (Kalyani & Kumar, 2011). Therefore, in Indonesia, almost every educational institution currently involves entrepreneurship in its curriculum. Entrepreneurship has begun to be introduced not only at the higher education level but also from the kindergarten, primary, and secondary education levels. The main goal is to produce graduates with the understanding and skills for entrepreneurship. These entrepreneurial graduates are expected to be more competitive and survive in today's highly competitive environment.

The push for the importance of entrepreneurship skills in Indonesia has also led to the emergence of various innovations in entrepreneurship learning. However, despite increasing attention, entrepreneurship skills in Indonesia are still considered ineffective (Heru Priyanto, 2012). It is indicated by the gap between the rise of entrepreneurship skills and the number of existing entrepreneurs, which is only 0.18% of the total population. On the basis of the analysis performed, several phenomena in the field become obstacles to the effectiveness of entrepreneurship skills, including 1) relatively little research on the effectiveness of entrepreneurship learning. As a result, teachers/lecturers who are comfortable with the teaching approach used in entrepreneurship learning tend to be less aware of what factors caused the approach to be effective or fail and why the approach was effective or failed. 2) The ongoing entrepreneurship learning model generally does not pay attention to the characteristics of local, demographic, and geographical resources. Consequently, school or university graduates do not optimize the opportunities and potential resources in their area. It has led to urbanization and increased poverty rates, particularly in rural areas. The low number of entrepreneurs in rural areas also causes low productivity, income, wages, and low savings and investment in the regions. Besides, 3) entrepreneurship learning management does not yet have a mutually agreed action plan, causing entrepreneurship learning to tend to be non-strategic and have low stakeholder support.

Moreover, entrepreneurship learning undeniably requires a multidisciplinary scientific approach, such as the heterogeneity of entrepreneurship and entrepreneurs. Theoretically, understanding entrepreneurship means involving various scientific backgrounds because the meaning of entrepreneurship is presently increasingly widespread and complex (Purnomo, 2014). Therefore, developing the potential for entrepreneurship skills is one of the main keys to producing quality human resources. Entrepreneurship skills integrated into learning can also build the students' characters and behaviors so that they can be independent in work or entrepreneurship later.

Many researchers have tried to integrate entrepreneurship into subjects, such as biology (bioentrepreneur), chemistry (chemoentrepreneur), engineering (technopreneur), and other subjects, to improve and instill entrepreneurship skills. Prihatiningrum (2020) studied the entrepreneurship of processing plastic waste into valuable and useful items.

Besides, bio-entrepreneurship (BEP) is the combination of two scientific disciplines: biology and entrepreneurship. It was found that there was a positive impact on increasing biology learning creativity, achievement, and interest in entrepreneurship. Research conducted by Wibowo et al. (2018) on the application of CEP-oriented chemistry learning can increase students' creativity in learning. A study performed by Permana et al. (2020) regarding Technopreneur Training in Building and Entrepreneurial Spirit for Prospective Architects in Consulting and Construction Services at the Indonesia University of Education trained entrepreneurship skills for students to have entrepreneurial spirit and skills and create a campus business incubator unit. Wicaksono et al. (2020) also developed a learning model of BIOSEL (Biotechnology Series Learning), allowing students to put their lessons together through a coherent and precise explanation of the concept of biotechnology implementation steps.

However, entrepreneurship skills integrated with a science called SciPreneuer, a combination of (physics, chemistry, and biology), have not been broadly studied and known, especially in overcoming economic problems.

In this case, science-based learning entrepreneurship is learning by applying natural science concepts into everyday life through designing and manufacturing products that have economic value and are in accordance with environmental developments (Martin, 2012; Sajidan et al., 2021). The essence of entrepreneurship-based learning is that students make a product with economic value by applying the natural science concept. Furthermore, the topic of biotechnology in natural science lessons can be linked to technology to provide contextual learning to students. This biotechnology topic can be packaged by making a product related to science, technology, engineering, biology, chemistry, physics, and entrepreneurship to empower students' entrepreneurship skills.

Supposedly, to encourage students' entrepreneurial skills, the learning model used can stimulate skills in the twenty-first century. In this case, the creative entrepreneurship-based discovery skills (CEL-BaDiS Up) model is one that may be applied. According to Dyer et al. (2011), the CEL-BaDiS Up model is a learning model that is innovative, focused on discovery skills built on a literature study and learning theories that underpin how to teach and empower SciPreneur abilities (Sajidan et al., 2021). The initial learning model of CEL-BaDiS Up is accomplished this through six activities of syntactic: associating, questioning, analyzing, creating, communication and persuasion, and networking entrepreneurship (Istiqomah, 2018; Rafida & Permana, 2020; Wahyudi et al., 2019), which is modified by following the development of science and research results, including skills in the industrial revolution era 4.0 and the era of society 5.0.

From the preliminary study, with students and lecturers, the interview results disclosed that biotechnology is a topic covered in applied science coursework for fourth-semester students at a university in Surakarta, Indonesia. It is because the biotechnology topic's qualities, including red, green, blue, and white biotechnology, are similar to those seen in everyday life (Atmojo et al., 2018) and simple biotechnology.

The novelty of this research is that it empowers SciPreneur skills by developing a learning model called CeLBaDiS UP. Currently, entrepreneurial innovation in biotechnology has begun to develop (Hine, D., & Kapeleris, J., 2006), including a variety of biotechnology entrepreneurial pathways, possibilities, and problems (Gurău, C., 2021). Biotechnology entrepreneurship integrates all activities by individual teams working together over time to build companies that create and commercialize life-changing products through a blend of disciplines and business (Shimasaki, 2020).

Also, it is because the complex biotechnology subtopics make it difficult for students to understand, aside from students having to create items based on what they have learned. Also, the average performance test results of the items created and the final semester exam for the previous two years support this assertion, revealing that average mastery remained in the low range. Based on the preceding context, this research aims to see how successful the creative entrepreneurship learning-based discovery skills (CEL-BaDiS) Up model is to enhance university students' SciPreneur skills, especially on biotechnology. SciPreneur skills need to be improved because they are one skill required in 21st-century learning. Educators should innovate in the application of daily life, not only as a teacher but also as a job creators through entrepreneurship. It is expected that the CEL-BaDis model can improve Sci-Preneur because it has a syntax that develops students' skills in entrepreneurship in biotechnology materials.

METHOD

Research Design

This quasi-experimental study used a pretest-posttest control group design (Creswell, 2014). This study applied the learning model of creative entrepreneurship learning-based discovery skills (CEL-BaDiS) Up in the experimental class. In contrast, the researchers implemented the project-based learning (PjBL) model in the existing class, which lecturers have usually implemented at the university. Each class was initially pretested before receiving treatment, which was then followed by a posttest. According to the scoring rubric, scores were given to the pretest-posttest results, in which the scores were then statistically analyzed.

Employing Structural Equation Modeling (SEM), i.e., a multivariate analysis method to describe the simultaneous linear relationship, the data were analyzed.

Structural Equation Modeling (SEM), a tool of multivariate analysis for describing the simultaneous linear connection between observed variables (indicators) and unmeasured variables (latent variables), was used to evaluate the data. Unobserved or unmeasured variables that must be measured using many indicators are known as latent variables. Then, endogenous and exogenous latent variables are the two types of latent variables used in SEM. The analysis was done utilizing the PLS (Partial Least Square) application.

SEM with PLS, according to Monecke & Leisch (2012) in Sarwono and Narimawati (2015:6), has three components:

Structural model (inner model)

The structural model, known as the inner model, is a model of the association between latent variables built from the theory's content.

Measurement model (outer model)

The link between the latent variable and its manifest variable is described by the measurement model, also known as the outer model (indicator). Two sorts of models in the outer model comprise formative and reflexive indicator models. When the manifest variable is impacted by the latent variable, the reflexive model is used, whereas the formative model implies that the manifest variable impacts the latent variable with causation flowing from the manifest variable to the latent variable.

Weighting scheme (weight relations)

It is unique to SEM with PLS and not seen in covariance-based SEM. The weight relation score, as Abdillah and Jogiyanto (2015: 153) stated, depicts the link between the indicators' variance values and their latent variables.

Population and Sample

This study's population was college students at the Elementary School Teacher Education Study Program in Surakarta. This study's sample comprised 150 students in their fourth semester in the academic year 2018/2019. The sampling was purposively performed at the university on the basis of the data from the final semester exam analysis and the SciPreneur test results on the initial profile.

The samples were selected based on the students' abilities which are homogeneous. The fourth-semester students were chosen because, in that semester, they were taught biotechnology.

In total, 75 students were assigned to the experimental class utilizing the CEL-BaDiS Up method, whereas another 75 students were assigned to the current class on campus, employing a traditional learning paradigm.

Lecturers who teach in the experimental and control classes were the same to ensure no different material delivery between the two classes to reduce bias. Lecture activities were also carried out within a short interval to reduce bias in the condition and time that can be a research bias.

Using the CEL-BaDiS Up model, the experimental class was taught with the following syntax:
1. Cognitive flexibility: The students made observations on customer problems for the sold products. Then, they looked up several articles or references based on the problems found to get ideas.

Information verification: The students validated customer needs and problems in the field and determined specific customer segments. They also determined the focus of the problem to be solved. In this verification stage, the students developed quality questions.

Judgment and decision making: The students determined the product to be produced as an alternative to solving problems in the previous stage. Then, with other groups, they did brainstorm to come up with alternate ideas or items to sell to customers. They also determined the advantages of the product to the other groups

Emotional intelligence: The students practiced making product innovations, making simple biotechnology products.

Coordinating with others: The students communicated the products created in the previous stage to the consumers with a gallery walk.

People management syntax: The students created teams, structures, and job descriptions for product marketing and budget plans for product manufacturing. Product marketing (distribution) was carried out in the form of direct offers to potential consumers by articulating the benefits of items via blogs, Facebook, YouTube, online stores, and Instagram.

Meanwhile, the control class applies learning through the Project-Based Learning model. The application of the Project-Based Learning model was chosen because this learning model follows the characteristics of the material being taught to produce a product with a project carried out by students. The PjBL model steps are:
1. Determining basic questions: The lecturer explains biotechnology material and asks the students questions concerning the application of biotechnology in everyday life.

Making project designs: The students in groups make product designs by applying biotechnology. The design preparation begins with a literature search from international journal articles. The students also conduct product analyses to look for the updates of the products to be developed.

Arranging scheduling: The students develop a timeline with a series of activities ranging from product design, product analysis in the field, product manufacture to product marketing.

Monitoring the progress of the project: The lecturer monitors the progress of the activities of each group that have been carried out.

Assessing the results: The students present their products that have been developed in groups, and other groups provide comments on the products

Evaluating the experience: The lecturer evaluates each group by providing input/suggestions for product improvement in the future.

Research Instruments

SciPreneur data were attained from a questionnaire instrument, which was compiled based on six SciPreneur aspect indicators: critical thinking skills, communication skills, problem-solving skills, observational skills, collaborative skills, and creativity and innovation (Sajidan et al., 2021). The instruments utilized had been expert validated, encompassing experts in education and evaluation, an expert in biotechnology, as well as a certified biology lecturer. Also, they had been validated empirically employing experimental tests, indicating valid and reliable instruments used. The questionnaire employed had a score interval of 1-5, adjusted to the respective criteria.

To determine the instrument’s validity, the Pearson Product Moment correlation test was employed. If r-statistics > r-table, the item is valid; on the other hand, if r-statistics < r-table, the item is considered invalid and cannot be utilized. With 20 students as respondents, the validity test instrument received the lowest score of 0.316 and the maximum score of 0.659 > f-table, with a value of RV = 0.443. It indicated that the SciPreneur item instrument was valid. Meanwhile, the reliability test score with Cronbach's Alpha obtained was 0.742> 0.443, signifying that each item was reliable to be applied in the experiment and existing classes. Meanwhile, in the control class, the PjBL model had no significant effect on biotechnology learning to empower SciPreneur skills. This supports that the CEL-BaDiS model can improve students' SciPreneur skills in biotechnology materials.

FINDINGS

The CEL-BaDiS Up learning model’s effectiveness in enhancing students' SciPreneur skills on the food biotechnology topic was analyzed utilizing SEM with the PLS application through several stages: the structural model (inner model) design, the measurement model (outer model) evaluation, and the measurement model (inner model) evaluation. The following is a description of each stage of data analysis.

The Structural Model (Inner Model) Design

The following is a list of latent variables and their manifest variables:

a. The exogenous latent variable CeL-BaDiS Up has six manifest variables (indicators): C1. Cognitive flexibility, C2. Information verification, C3. Judgment and decision-making, C4. emotional intelligence., C5. Coordinating with others, and C6. People management.

b. The endogenous latent variable of SciPreneur skills has six manifest variables (indicators): E1. Critical thinking skills, E2. Problem-solving skills, E3. Communication skills, E4. Collaborative skills, E5. Observational skills, and E6. Creativity and innovation.

When evaluating the measurement model for Elementary School Teacher Education student respondents, the indicators employed were not valid and reliable entirely. Thus, for this research, the suitable structural model was then attained, as in the following figure:

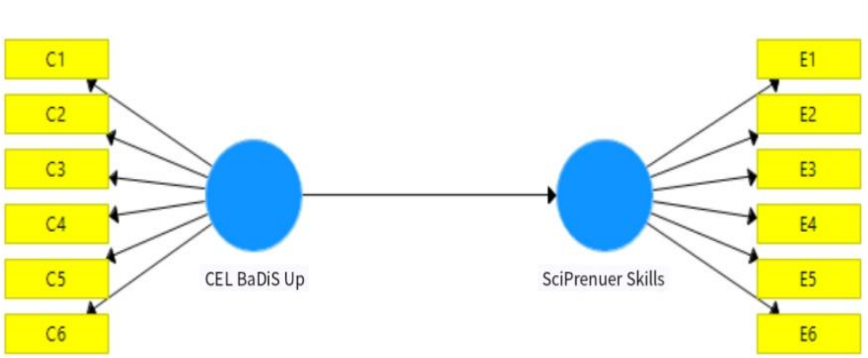

Figure 1
Chart of research model design

The Measurement Model (Outer Model) Evaluation

Convergent Validity Test

The correlation between indicator and construct scores can be used to evaluate the reflective indicators' validity. When reflecting indicators are used to measure a construct, they reveal a change in one indicator when other indicators in the same construct change. Below are the findings of the SmartPLS 3.0 computer program's calculations:

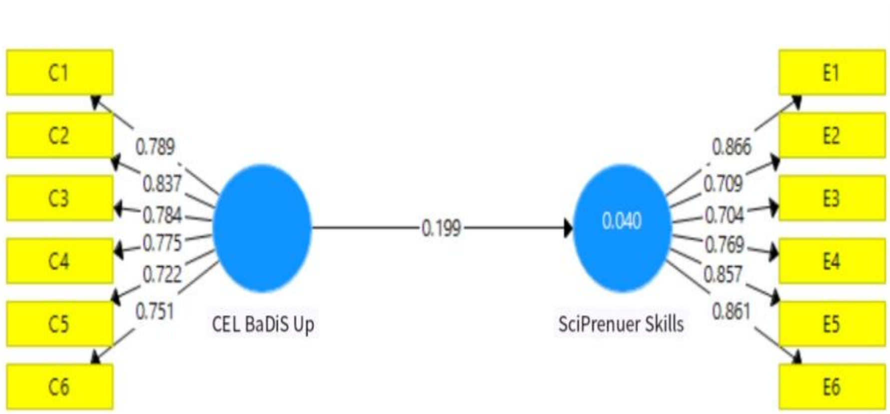

Figure 2
Output loading on factor modeling

If a correlation has a loading value of more than 0.5, it is deemed to have convergent validity, according to Chin (1998) in Ghozali (2012: 25). The results showed that the loading factor was more than the suggested value of 0.5 in this study. As a result, the indicators utilized in this investigation were shown to have convergent validity.

Discriminant Validity Test

Discriminant validity must be tested for reflective indicators by doing a comparison of the cross-loading table values. Compared to the loading factor values for other constructions, an indicator is considered valid if it has the greatest loading factor value for the targeted construct.

Table 1
Output for cross-loading

	CEL-BaDiS Up	SciPreneur Skills
C1	0.789	0.139
C2	0.837	0.217
C3	0.784	0.179
C4	0.775	0.123
C5	0.722	0.028
C6	0.751	0.089
E1	0.195	0.866
E2	0.081	0.709
E3	0.127	0.704
E4	0.198	0.769
E5	0.157	0.857
E6	0.138	0.861

Composite Reliability Test

According to Sarwono and Narimawati (2015: 18), if the latent variable's composite reliability value is more than 0.7 and its Cronbach's alpha value is higher than 0.7, a latent variable has strong reliability.

Table 2
Reliability test on latent variables

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)	Description
CEL-BaDiS Up	0.877	0.901	0.604	Reliable
SciPreneurship	0.886	0.912	0.636	Reliable

According to the table above, this study's all latent variables had Cronbach's Alpha as well as composite reliability values more than 0.7, implying that all latent variables were reliable.

Structural Model (Inner Model) Evaluation

The purpose of the significance test on the SEM model with PLS was to see how exogenous factors affected endogenous variables. With the PLS-SEM method, hypothesis testing was done by utilizing the SmartPLS 3.0 computer application to undertake a bootstrapping procedure, resulting in the following connection between the effect of exogenous factors on endogenous variables:

Table 3
Significance test (Bootstrapped)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)
CEL-BaDiS Up -> SciPreneurship skills	0.199	0.239	0.095	2.105

The T-table values are known before testing the hypothesis for the 95% confidence level (α 5%) and the degrees of freedom (df) = n - 2 = 150 - 2 = 148 were 1.976. On the basis of the findings of the statistical T-table output and the table above, the influence of CEL-BaDis Up (X1) on the SciPreneur skills (Y) variable was 2.105 > T-table (1.976). In addition, the original sample estimate value of 0.199 was positive, indicating that the relationship's direction between the CEL-BaDis Up (X1) variable and the SciPreneur skills (Y) variable was positive. It denoted that in this study, the latent variable CEL-BaDis Up (X1) with its indicators affected the latent variable SciPreneur skills (Y) with its indicators significantly. In the control class, no significant difference was found in using the Project-Based Learning model in empowering SciPrenuer skills.

DISCUSSION

On the biotechnology subject, the creative entrepreneurship learning-based discovery skills (CEL-BaDiS) Up model has the potential to boost SciPreneur, as shown by the SEM analysis results related to the effect of the CEL-BaDis Up (X1) variable on the SciPreneur skills (Y) variable of 2.105 > T-table (1.976). The syntactic activity outcome of the CEL-BaDiS Up model, which is on the basis of various research on learning theory teaching students' SciPreneur skills, is this treatment. The CEL-BaDiS Up learning model guides students' SciPreneur aspects through six syntaxes which include cognitive flexibility, information verification, judgment and decision-making, emotional intelligence, coordinating with others, and people management (Atmojo et al., 2018; Tampieri, 2014). Some research results using learning models can improve creativethinking skills, such as the research result of (Rahardjanto et al., 2019) on the use Hybrid-PjBL to improve pre-service teachers' creative thinking.

The syntax of cognitive flexibility in the CEL-BaDiS Up model on biotechnology material empowers the SciPreneur aspect in the critical thinking skills aspect. Empowerment of critical thinking skills aspects through cognitive flexibility syntax is on the basis of activities at this stage that can assist it. Cognitive flexibility syntax was the first stage of activity in the developed learning model, which began with the cognitive flexibility stage, where students observed customer problems related to products that had been sold. Next, students looked for several articles or references based on the problems found to get ideas. To search for ideas, exploring material on the internet that would inspire their creativity. The ability to generate ideas is part of the creative component, which was fostered by analyzing a minimum of six research articles, comprising three scientific articles from domestic research and four research articles from abroad. The articles analyzed were articles about the biotechnology research results used as a reference source to make a new product (for example, fermented food). From the analyzed articles, students could grow their ideas to create a new product or a modified product from an existing product. This stage could also empower problem-solving skills because, through this stage, students could solve problems to generate new ideas and ideas because of modifying some analyzed research articles. Moreover, based on learning theory, there is support. This stage associates knowledge and is written in the CEL-BaDiS Up model's syntax since in the form of categories, Bloom's thinking taxonomy gives opportunity to students to practice higher-order thinking abilities, including creative thinking skills (Anderson & Krathwohl, 2015). As the end-activity, students might submit an initial draft plan (concept) to make a simple biotechnology product, such as a fermented product, which would eventually be employed for the subsequent step of CEL-BaDiS Up at this early level.

The second syntax, information verification, on the biotechnology topic effectively trains SciPreneur skills aspects on critical thinking skills aspects. The activity in the information verification syntax was that students validated problems and customer needs in the field and determined specific customer segments. Students also determined the focus of the problem to be solved. At this verification stage, students developed quality questions. High-quality questions must have particular characteristics, including (1) clarity, (2) purpose, (3) usefulness, (4) level adjustment, (5) sequence, (6) thinking orientation, (7) flexibility, and (8) is well built (Yesil & Korkmaz, 2010). The occurrence of a questioning syntactic interaction process regarding a new product might promote critical thinking abilities to develop questions and answers, as well as skills to give alternative challenges to produce new goods (Ronoili et al., 2019). It supports the idea that practicing higher-order thinking abilities, inquisitive competency, creativity, critical thinking skills, and the character of a lifelong learner may all be developed via inquiry (Tofade et al., 2013; Yang et al., 2005). In addition, students can use questioning skills to push them to think about their beliefs and consider alternative points of view (Salmon & Barrera, 2021). This syntax also stimulates the creation of suggestions, questions, and scientific explanations highlighted the product to be created. Because students were expected to evaluate scientific publications before asking high-level questions, the information verification syntax in the CEL-BaDiS Up model could optimize cognitive flexibility syntax because they needed to complete the analysis first before asking the question. In addition, this syntax builds a social system between students and the environment (Ertikanto et al., 2018). Meanwhile, the role of the lecturer here is to guide and ask questions or motivate students. (Hogan Patrick & S T, 2011).

Furthermore, the judgment and decision-making syntax is the third stage in the CEL-BaDiS Up model. This stage could foster observational skills and problem-solving skills. This stage can be applied to study natural science disciplines, which can expand students' minds, use facts about life, scientist activities, interesting facts related to physical phenomena, and chemical objects, and can improve the learning process (Misiejuk et al., 2021; Politsinsky et al., 2015). This stage’s activity was a continuation of the information verification stage, which had yielded a new product plan resulting from fermentation that had been fixed, a result of input and suggestions from students and other groups. With other groups, students brainstormed to come up with alternate ideas or items to sell to customers. The benefits of the product to be presented to other groups were also determined by the students. The findings showed that problem recognition could encourage solution ideas for surrounding problems (Erlina et al., 2018). To find out whether the product to be made had been available in the market or not, students analyzed traditional markets, supermarkets, and online shops. This activity aimed so that if the fixed plan of the product to be made turned out to exist already or was the same as the existing product, students needed to make a difference in their products up to the stage of preparing a production strategy plan. Based on this stage’s activities, it turned out to be able to improve students' ability to develop and detail ideas to be more detailed and interesting (Hartono, 2015). The result at this stage was a product plan that had been finalized and was ready to be made at the next stage.

The fourth syntax is emotional intelligence. This stage can empower creativity and innovation. At this stage, students made product innovations, a process of making simple biotechnology products, for example, fermented items, designed and finalized at the analyzing stage. With the help of a lecturer and two teaching assistants, the creation process was carried out on campus in the natural science laboratory. Making a new product necessitates a high level of creative thinking; thus, activities at this stage can help to enhance the capacity to create new goods (originality) and develop new ideas by modifying existing products using a unique manufacturing technique to create new biotechnology products (Goncalves & Cash, 2021). During the learning process, teachers should allow students to communicate their innovative thoughts via experimental activities (Diwakar, 2019). Students also designed creative marketing models from products developed per customer psychology. This stage gave students the flexibility to design effective and efficient operational procedures. Students' creative thoughts can be improved by creating a learning environment by allowing them to think divergently (Sternberg, 2018). The findings showed that students were given the opportunity to explore, invent, and come up with creative ideas regarding the subject provided by the teacher in the learning environment (Hawley, 2018). This syntax resulted in a novel product derived from a basic biotechnological process, such as fermentation, that had progressed past the previous stage.

The following syntax of the CEL-BaDiS Up model is coordinating with others, which can improve communication skills and problem-solving skills. Learning activities at this stage were students communicating the products created in the previous stage to consumers, starting from the closest environment, namely friends in the campus environment. On a poster of 50x50 cm, the materials utilized, how to produce the product, and the product content were all presented. Posters were employed as a medium to help "customers" obtain information about the items manufactured and help product creators communicate their media content to others. The gallery walk approach was used to carry out this task (Isabel et al., 2019).

The gallery walk was carried out in stages. Each group made a poster out of cardboard interestingly and informatively so that readers could know the poster contents about the products made. Each group then attached the posters made and presented the products they made. After that, each group divided the tasks of its group members; some acted as sellers, and some acted as buyers. Each seller was tasked with explaining the products made to buyers, utilizing posters and the products made, while the buyers were tasked with providing suggestions and input on products created by other groups. The inputs given focused on taste, packaging, nutritional content, how to make it, and the product price. Buyers made suggestions by walking around each group until they returned to their own group and traded positions with buddies.

This stage’s result was suggestions or input from others concerning the products created, which were marketed on a limited (small) scale so that each group could enhance the products to be sold on a large scale. In this case, feedback or suggestions from consumers became the basis for expanding and enhancing cooperation with production and distribution partners. This stage could improve communication skills, namely a way to convey opinions, or information, to recipients to convey opinions orally, behavior, or utilizing the media indirectly.

Communication can involve exchanging ideas, opinions, and information with a specific purpose and can change a person according to the circumstances of the surrounding environment (Haji et al., 2012; Sriarunrasmee et al., 2015). It is vital to consider how to communicate effectively for the message to be understood by others when engaging in communication activities (Gebrekrstos et al., 2021). In addition, this stage could also improve students' problem-solving skills because, from the results of suggestions and input from consumers, they thought about effective ways to market products, improving their problem-solving abilities.

The last stage of the CEL-BaDiS Up learning model is people management, which can improve collaborative skills. At this stage, the activities carried out were students making teams, structures, and job descriptions for product marketing and budget design for product manufacture. Product marketing (distribution) was carried out in the form of making a direct offer to potential purchasers by presenting the benefits of the product. This step might be accomplished by marketing on blogs, Facebook, YouTube, online stores, and Instagram, as well as presenting product photographs and employing communicative and informative language to entice readers to purchase the items created. Because they had already received input, ideas, and adjustments, items that had reached this stage were expected to be ready for consumption. The use of social media in the marketing of student-made items sought to provide students the capacity to influence purchasers verbally directly and the ability to persuade using writing, images, colors, and layouts. Regarding this, social media can open up new opportunities for communicating, collaborating, and connecting between individuals (Jan & Landicho, 2020). Besides, the power of social media may raise sustainability awareness and impact shopping decisions to buy goods offered on social media (Verdugo & Villarroel, 2021). This stage’s results were fermented food products that students had marketed in various ways. Feedback and suggestions were also given by buyers to make the product better. Also, this activity’s output was that students could make activity reports. In this stage, collaborative skills could be empowered.

CONCLUSION

According to the research findings, the creative entrepreneurship learning-based discovery skills (CEL-BaDiS) Up model, which was used on the theme of basic biotechnology, might help university students grow their SciPreneur skills.

This is proven by the syntax of the CEL-BaDiS Up learning model, which can facilitate students to develop several aspects of SciPreneur skills in every aspect of critical thinking skill, problem-solving skills, communication skills, collaborative skills, observational skills, and creativity and innovation, which could be enhanced effectively by means of the activities in CEL-BaDiS Up model.

Thus, research has theoretical and practical implications. In theory, this research can be used as a reference for future researchers in developing learning models. The development of learning models is needed to develop skills in the 21st century. In practice, the research findings can be constructive input for lecturers in finding the best solution to the complexities of the times and for students in renewing their skills. Lecturers are suggested to develop learning models according to student needs and the times.

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