

Case Studies of Transdisciplinary Approach in Vocational Schools: Student Business Center Program

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ARTICLE INFO

ABSTRACT

Article history

Received Apr 13, 2024

Revised Nov 08, 2024

Accepted Nov 29, 2024

Keywords

Transdisciplinary Approach

Team Teaching

Student Business Center

The transdisciplinary approach to project-based learning is very interesting to study. Collaboration between several sciences produces integrated scientific products that will improve students' ability to solve a problem based on collaboration of scientific perspectives. Vocational schools that have a vision to produce competent and skilled experts in their fields must provide a foundation of other sciences in order to create quality human resources. This study attempts to collaborate several sciences (transdisciplinary) through project-based learning with the team-teaching method. This study also describes the stages in a case study of the transdisciplinary approach at one of the vocational schools with an excellent program (SMK center of excellence) in Sidoarjo Regency, Indonesia. This type of research is included in descriptive qualitative research with a case study approach. There are several problems in implementing the transdisciplinary approach to the student business center (SBC) program, namely: lack of time to collaborate, group dynamics played by some teachers are less effective, overlapping roles and inadequate funding. However, through the formation of teams in the classroom in a balanced manner, students can learn tolerance with peers, learn leadership skills and collaboration between teams. In addition, through a transdisciplinary approach, students will learn about the democracy of the learning environment by valuing their voices and teachers who empower them as students. The results of the evaluation related to the student business center (SBC) program through the distribution of questionnaires to students with 19 learning response indicators showed a figure of 65% or in the good category.

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Introduction

Starting from basic education to higher education, each science is still based on knowledge and understanding of science that stands alone (Thomas, 2018). Karali states that in most large and developing countries each discipline is divided separately based on the scope of science, social, mathematics, literature, religion and art (Karali, 2021). The focus of choosing scientific fields in Indonesia (majors/directions) in the new curriculum occurs when students complete junior high school (Rufaidah, 2015). Students are welcome to choose a high school with a scope of majoring in science, social, language or vocational school with majors in industrial expertise and entrepreneurship. In addition, as a country where the majority of the population is Muslim, there are madrasa that provide a focus on the field of religion (Abdulloh, 2019).

The curriculum based on this is better known as the scientific discipline-based curriculum (Kridel, 2010). The concept of a scientific discipline-based curriculum aims to provide depth to students that the science is structured and always in contact with other sciences in different contexts (Karali, 2021). Healey termed the objectives of the scientific discipline curriculum with the word networking (Healey, 2013).

In connecting one science with another, it is necessary to integrate the curriculum in an integrated manner through a multidisciplinary, interdisciplinary to transdisciplinary approach (Loepp, 1999). In simple terms, an integrated curriculum is to make connections between subjects or sciences (Drake, Rebecca, 2000). Multidisciplinary, interdisciplinary and transdisciplinary approaches provide many useful benefits for developing lifelong learning skills. In addition, this approach is useful as an important provision in the learning of students in the future (Jones, 2010). In applying a multidisciplinary, interdisciplinary and transdisciplinary approach, collaborative team-teaching cooperation is needed. Team teaching will make learners learn about tolerance, leadership skills and collaboration with peers (Boyer & Bishop, 2004). Studies conducted by Boyer and Bishop on 77 learners in three secondary schools showed that the majority found useful experiences about long-term relationships, democracy in a learning environment by respecting their voices and empowering them as learners (Boyer & Bishop, 2004).

Team teaching in education in Indonesia is currently termed project-based learning. Project-based learning in the implementation of an independent curriculum (IKM) must use a multidisciplinary, interdisciplinary and transdisciplinary approach. Each school is welcome to choose or sort out the use of this approach in project-based learning. Vocational schools or in naming in Indonesia with the term vocational high school (SMK) is a level of secondary education

that aims to prepare experts / personnel who have and master expertise and skills according to their respective fields (Moodie, 2002).

The development of skills and skills of students in vocational schools is required to have a product of every project-based learning. The project developed is expected to use a transdisciplinary approach, namely where a discipline is crossed with other subject matter (Jones, 2010). A transdisciplinary approach is used to address problems as well as difficulties in connecting industry with the development of educational programs (Ertas, 2003).

As one of the vocational schools of excellence (Vachruddin et al, 2023), SMK YPM 3 Taman designs and practices a project-based learning program with a transdisciplinary approach, namely the student business center (SBC). The program is an innovative form of learning and involves five integrated subjects, namely Islamic religious education, entrepreneurship, graphic design, accounting and productive economy. The program is implemented through team teaching activities consisting of groups of subject teachers and groups of students who work alternately. The products produced in the student business center (SBC) program must go through four stages, namely: introduction, contextualization, action, reflection & follow-up.

Previous research on transdisciplinary approaches with the formation of a team consisting of nursing educators, medical librarians, laboratory experts and technologists aimed at leading the integration of electronic health technologies, high simulations, handheld technology and electronic health records in nursing schools (Griffin, 2010). Other research was conducted on mapping children's learning and development through a transdisciplinary approach in terms of psychology, education and linguistics (language). The study seeks to conceptualize early childhood teaching based on the answers of children, families and communities of minority people of color (Souto, 2019).

The novelty in this study is the application of project-based learning through the student business center (SBC) program at SMK YPM 3 Taman (case study) which is collaborated through a transdisciplinary approach from the scientific perspective of religious subjects, graphic design, marketing accounting and entrepreneurship. This study focuses on the rhythm or flow of the application of the transdisciplinary approach through project-based learning which is divided into four stages, namely introduction, contextualization, action, and reflection and follow-up. This study also conveys the problems and benefits found in the program through team teaching evaluation and questionnaire distribution.

Method

This research is included in the type of descriptive qualitative research with a case study approach. This case study research focuses on one site, namely a vocational school in Sidoarjo Regency called SMK YPM 3 Taman. According to Creswell, the case study is a research strategy that will be used by researchers if they want to carefully investigate a program, event, activity, process or group of individuals (Creswell, 2007). The focus of the case study is to determine additional dynamics in order to strengthen and be able to question a theory (Lyeines, 2001). The data in this study was collected based on observations, depth interviews, questionnaire distribution and written documents. This case study is carried out carefully, carefully and according to research procedures in order to produce a research result that is rich in interesting substance weights (Percy & Kostere, 2015). The following are the core research question items that shown on table 1 :

Table 1. research question items

No.	Question
1.	How are the stages and processes for implementing a student business center (SBC)?
2.	How is the role of the teaching team in developing a transdisciplinary approach to the student business center (SBC) program?
3.	What and How are the obstacles and findings from implementing the student business center (SBC) program?

Learning economics-productive subjects with a transdisciplinary approach is carried out for 2 consecutive months through team teaching that has been formed by the school. The first stage that is carried out before carrying out the learning is to make learning instruments that are outlined in the teaching module. The learning instrument was prepared by several teachers who formed a teaching team. After the teaching module is formed, the verification stage is carried out by the vice principal of the curriculum field to conduct a review and further study. After the verification stage and obtaining approval, the learning is carried out with monitoring in stages. The assignment of making the final product is a final reflection of learning through this transdisciplinary approach. The final stage is the evaluation, which is carried out in two stages, namely the teaching team discussion related to the obstacles in the learning and the random distribution of questionnaires to the sample, namely the students. And the process of the research is shown on Figure 1.

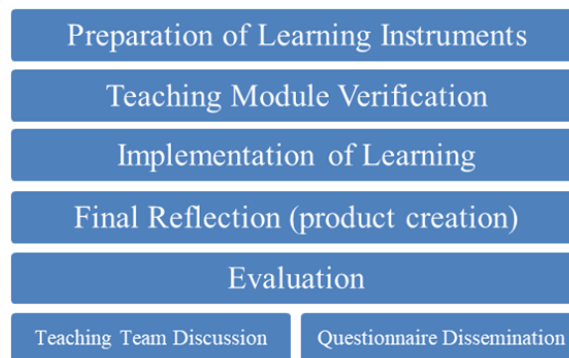


Fig 1: Process of the research

Result and Discussion

Transdisciplinary Approach to Learning in Vocational Schools

There are differences among scientists in defining transdisciplinary approaches. According to Jones the transdisciplinary approach is where a discipline is crossed with other subject matter (Jones, 2010). Ertas also defines that a transdisciplinary approach is used to address problems as well as difficulties in linking industry to the development of educational programs (Ertas, 2003). In applying a transdisciplinary approach to education, Nicolescu offers a transdisciplinary methodology that he introduces with the term towards transdisciplinary education. According to Nicolescu the transdisciplinary methodology is built on the basis of three assumptions that are considered correct namely: something that exists, knowledge of nature and levels in reality (Nicolescu, 2005). Nicolescu underlines that transdisciplinary education based on and built using transdisciplinary methodologies will allow scientists to establish relationships between people, facts, images, representations, fields of knowledge and facts (Nicolescu, 2005).

The hashtag as a vocational school in Indonesia is a strong vocabulary, “Kuat-Menguatkan Indonesia” especially from the human resources sector. The quality of human resources will positively affect the quality of the environment in Indonesia (Shanty & Sugiyanto, 2018). Even through good human resource management, it will be able to reduce poverty and population density and will increase the country's economic growth (Shanty & Sugiyanto, 2018). Therefore, vocational schools have a vision to produce competent and skilled experts in their respective fields (Wahyudik, 2018). So, the portion of field practice both with the world of work and industry is more done than just learning theory in the classroom (Nafiah & Suyanto, 2014).

On this basis, learning of productive subjects or skills in vocational schools is more dominated by field practice than just strengthening theory. But on the other hand, strengthening theory is necessary to provide an understanding of something and direct reason to infinite creation and

imagination (Himes, 2014). Collaboration of several teachers in productive subjects is needed in a transdisciplinary approach. There are no special additions to class hours, but each teacher uses their own subject hours maximally to connect with the Productive-Economy subject matter, namely about "Student Business Center (SBC)".

The transdisciplinary approach to the Student Business Center (SBC) program is connected to five subjects, namely productive economics, religion, entrepreneurship, graphic design and accounting. Each of these subjects will look at the theme based on their respective points of view that will lead students to create a product that is a collaboration of understanding the five sciences. The educational and training backgrounds of these teachers are also the focal point of the school asking them to collaborate on a transdisciplinary approach to economic-productive subjects. Such as the background of the training that religious teachers participate in. It was noted that the religious teacher attended the training of the Indonesian halal certification body in collaboration with the halal center institution of Ma'arif Hasyim Latief University (UMAHA). In addition, he also attended training on independent product resistance trials and laboratory tests held by the Food and Drug Supervisory Agency (BPOM).

In addition, entrepreneurship and economic-productive teachers also participate in certified digital marketing training so that later they will be able to direct the products produced by students to promotions and online sellers. In addition, the school facilities system has also been integrated between the "Nurul Islam" school Mini Bank Lab and the school-owned minimarket, namely "S-MART" with an online transaction system through the school's e-wallet application, namely DASIGU (student and teacher funds) (Vachruddin, Hamid, Nasril, 2022). Students can borrow capital from the school bank and can entrust dry food and beverage products that have gone through the food/beverage resistance testing process at the school convenience store "S-MART". Money from dry food and beverage products will be connected to the DASIGU e-wallet account with a fund-raising system through the school's Mini Bank that shown on Figure 2.

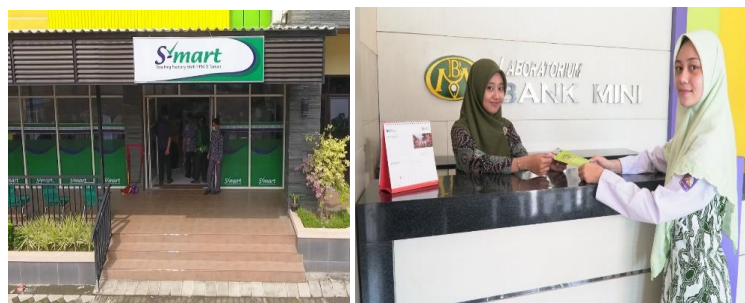


Fig 2: S-Mart Mini market and Integrated Banking Laboratories

The Role of the Teaching Team in Student Business Center Program

Team teaching is a technique in integrating several disciplines by forming groups of teachers who work together to design curricula, teach schedules and team formation in the classroom as well as set the time period needed to learn a theme (Jones, 2010). Team teaching is a popular approach with a variety of benefits. As stated by Boyer and Bishop, through the formation of teams in the classroom in a balanced manner, students can learn tolerance with peers, learn leadership skills and collaboration between the teams. They will also learn about the democracy of the learning environment by respecting the voices as well as the teachers who empower them as learners (Boyer & Bishop, 2004).

The case study of the transdisciplinary approach of economic-productive subjects at SMK YPM 3 Sidoarjo was divided into two groups of team teaching models. The first group is a teaching team consisting of subject teachers who are connected to the theme of economic-productive subjects. A transdisciplinary approach can be carried out well if a teaching team is formed consisting of subject teachers who carry out the collaboration. The teaching team was led by an economic-productive teacher with the initial agenda, namely a discussion on the design of teaching modules with the theme of "Creative Economy Product Development" with a transdisciplinary approach. The teaching module is designed based on the independent curriculum implementation standards (IKM) set by the government as the basis for implementing learning (Barlian & Solekah, 2022). The teaching team will share their respective tasks and roles in the classroom based on mutually agreed discussions. The allocation of class hours for each subject is fixed and the end result of transdisciplinary learning is creative, innovative and selling food and beverage products. While the second group contains students with the accuracy of each group of 5-6 people formed by the teacher based on the principle of balance. Teachers will map and form groups fairly based on the abilities and backgrounds of each learner and that shown on Figure 3.

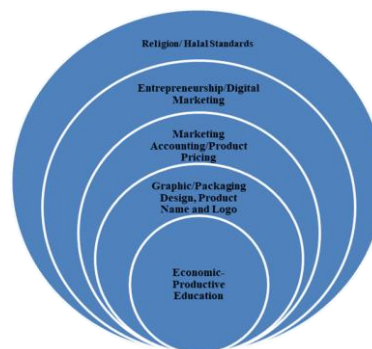


Fig 3: Transdisiplinary Approach in Economic-Productive Education

The emphasis in learning is on group independence, group cooperation and group ability to solve problems so as to create products of their creation. Teachers are facilitators and provide the information and skills needed by each group of learners. Economic-productive teachers have a very significant role, especially in monitoring the activeness of each member of the student group.

Several problems and problems arise in the application of team teaching such as lack of time in collaboration, group dynamics played by several teachers less effectively, overlapping roles and insufficient funding. This is in accordance with what Haynes said about the weaknesses of team teaching (Haynes, 2002). In particular, we sort the factors for the occurrence of the problem. The lack of time in collaboration occurs due to the curriculum rule factor that one maximal theme is taught in a period of 2-3 months. Then the group dynamics are less effective due to the lack of training for teachers. Overlapping roles also occur due to the selfishness and indifference of both teachers and students. The factor of insufficient funding is the right to manage schools which greatly minimizes learning administration expenditures. Not only in private schools, but in State schools, there is also a prohibition against asking for withdrawals or financial assistance to guardians of students. Some of these problems can be used as evaluation studies in the future to implement effective and efficient team teaching.

Student Business Center Process with Transdisciplinary Approach

The case studies in this study seek to collaborate transdisciplinary methodologies with team teaching based on project-based learning. This transdisciplinary approach in economic-productive subjects is collaborated with subjects of religion, graphic design, marketing accounting and entrepreneurship. The case study was conducted at a vocational school in Indonesia located in the YPM CENTER Complex, Jl. Raya Ngelom Megare No.30, Ngelom, Taman District, Sidoarjo Regency, East Java 61257. The school is a private school that is classified as elite with a total of 1186 students, which is under the auspices of a foundation, namely the ma'arif educational and social foundation (YPM). The official naming of the school in the main data of education in Indonesia is SMK YPM 3 Taman.

Project-based learning in economic-productive subjects with this transdisciplinary approach carries the theme "Creative Economy Product Development". Collaboration of a transdisciplinary approach with team teaching, before learning is carried out, a teaching team is formed consisting of several other scientific teachers who are collaborated with economic-productive subjects. Because this project-based learning is the implementation of an independent curriculum (IKM), the teaching team is required to compile the learning project module (Rachmawati, 2022). The project module

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consists of four stages, namely introduction, contextualization, action as well as reflection and follow-up. These stages are carried out sequentially.

This module of economic-productive learning projects with a transdisciplinary approach consists of: project framework, framework objectives, related characters, differentiation and relevance, stages, meeting planning, reflection sheets and product assessments. The most important aspect of the project module is the important character that is formed and built in the development of related projects (Almazroui, 2022). Project-based learning in economic-productive subjects with the theme "Creative Economy Product Development" aims to form character: 1). Have faith and piety in God Almighty, 2). Love of the homeland, 3). Creative and 4). Collaborate (Zainuri, 2022).

The transdisciplinary approach to economic-productive subjects will be focused on the stages of action and reflection & follow-up. The following are the stages of project-based learning of student business center (SBC) with a transdisciplinary approach That Shown on table 2 and Figure 4:

Table 2. Stages in Project-Based Learning with a Transdisciplinary Approach

Stages	Activities/Processes	Purpose
1. Introduction Stage	<ul style="list-style-type: none"> At the beginning of the learning of creative economy subjects, the teacher explained that the theme of the material was "Creative Economy Product Development" The creative economy teacher explained that at the end of this project-based learning activity, it is required to make and develop food and beverage products that have selling points, besides that the teacher also discusses and explains in terms of choosing food-beverage products that have creative selling value, marketing products offline and online. Religious subjects discuss and explain from the side of trading honestly and amanah, the definition and requirements of halal products in Islam in terms of names and ingredients of manufacture. Entrepreneurship subjects discuss and explain in terms of creative-value food and beverage products, making attractive promos, packaging and others. Graphic design subjects discuss and explain in terms of how to design logos, names and packaging in a clear, attractive and unique way. The subject of marketing is discussing and explaining in terms of product price, calculating the price and the way of marketing is good. Formed a team of 4 people who are determined to find, select and research what food and beverage products they will develop. The team conducted field observation both to neighboring stores, schools and online product observation. The products developed can be products made by neighbors, parents or homemade. 	Building awareness of students to get used to entrepreneurship both in schools that provide Tefa (teaching factory) facilities and outside of school and love domestically made products
2. Contextualization Stage	<ul style="list-style-type: none"> After finding and choosing a food and beverage product plan to be developed, each team must first get the approval of an economic-productive teacher, then welcome to discuss with religious teachers in terms of halal products, with entrepreneurial teachers related to product opportunities and promos, graphic design teachers related to logo design and product names, with marketing accounting teachers related to normal pricing and promos. 	Contextualize food-beverage products in the school environment and surroundings (community)
3. Action Stage	<ul style="list-style-type: none"> Verifying the halalness of products to religious teachers regarding names and ingredients. Conducted product resistance trials of both dry, wet food and beverages verified by teachers of productive economy and entrepreneurship. Verification of logo design and product name guided graphic design teacher. Verify normal selling prices and promos at marketing accounting teachers. 	Each team or individual will implement the actions of the learning already outlined.
4. Reflection & Follow-up Stage	<ul style="list-style-type: none"> Make food and beverage promotional posters that they show off and sell at the student product exhibition bazaar. Make promotional videos The advantages of food-beverage products that they show off at the product exhibition bazaar. Wet, dry food and drinks that have been tested for durability and have not been sold in the bazaar can be deposited at the school minimarket (S-MART) with an online sales collection system through the school's e-wallet application "DASIGU" which can be disbursed through the school's mini-bank. 	Exhibition of students' food-beverage products and used as material for evaluation and reflection. Strategize in following up on advanced programs



Fig 4: Dry, Wet Food and Beverage Products at the Student Business Center (SBC)

Evaluation of Student Business Center Program in Transdisciplinary Approach

Learning evaluation is carried out by distributing questionnaires in several classes as samples. The class was randomly selected with a sample of 77 students consisting of two classes. The number of indicators displayed in the questionnaire consists of 19 indicators that show the evaluation of economic-productive learning with a transdisciplinary approach. The questionnaire was distributed through the Google Form application which was processed based on the Likert scale with 5 categories, namely very less, less, neutral, good and very good (Likert, 1932). The selection of the Google Form application aims to make it easier for researchers to process data (Butarbutar, Suhenda, 2021). The lowest percentage of the score from the questionnaire lies in the simple or complicated indicator of how the learning is applied. The percentage on the indicator is 57% or neutral. While the highest percentage of value from the questionnaire lies in the indicator of the usefulness of the learning process with a percentage of 76% or good category. The total percentage value of the 19 indicators in the questionnaire showed 65% or in the good category. The following is a breakdown of the percentage value of each indicator in the questionnaire distributed in the research sample.

Conclusion

The transdisciplinary approach as the highest approach in scientific integration should get an important point of attention both in terms of collaboration between teachers effectively and efficiently by eliminating selfishness and indifference. In addition, teachers must also have a role in monitoring the activeness and involvement of each group member of the learner in student business center program (SBC). Schools must also be bold to fund projects in this approach to improve the competence and expertise of learners so that they can adjust to the world of business, industry and work. Later, it is hoped that the products produced by students can be of selling value both through digital marketing and school facilities in the form of S-MART mini markets. This study highlights the importance of collaboration between teachers, the need for active monitoring of students, and the

need for school funding for project-based learning. These challenges can potentially serve as a reference for schools in developing project-based learning with a transdisciplinary approach so that students can learn about tolerance with peers, leadership skills, collaboration between team members and democracy.

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