

# Improving Students' Creativity Using Project-based learning and Spreadsheets Module

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Entrepreneurial activity is one of the things that encourages an increase in the economic welfare of a country. The Regulation of the Minister of Education and Culture as stated in the 2013 curriculum requires that each field of expertise be able to implement the knowledge learned in the Creative Products and Entrepreneurship subject. This regulation has not been able to be realised in reality. The data shows that 43.75 percent of students have low creativity in creating products according to their accounting expertise. The purpose of this study was to determine the effectiveness of applying the Creative Product and Entrepreneurship Module based on project-based learning and spreadsheets to increase students' creativity. The research method used was quasi-experimental research. The research samples were class XI Accounting 2 and XI Accounting 3 at SMK N 1 Surakarta. Data collection techniques used were questionnaires and written tests. The effectiveness test results using the t-test showed a significance value of 0.00, and the N-Gain value for the experimental class was 0.71. Based on the data analysis results, a significance of <5% indicated that the module is effectively used for learning, while an N-Gain value of more than 0.70 indicated an increase in students' creativity in a high category.

**Key words:** *Creative Products and Entrepreneurship, Project-based Learning, Spreadsheets*

## Introduction

Entrepreneurship is an essential part of improving a country's economic welfare (Anosike, 2019, p. 43). It was explained by Doran, McCarthy, & O'Connor (2018, p. 4) that entrepreneurship is a solution for driving a country's economic growth. The increasing number of entrepreneurs contributes to society's welfare by creating new jobs (Camacho-Minano & Campo, 2017, p. 673; Sutter, Bruton, & Chen, 2019, p. 198). Based on data from the Global Entrepreneurship Index for 2019, Indonesia is ranked 75th out of 137 countries surveyed (The

Global Entrepreneurship and Development Institute, 2019). Also, Tulung (2020) noted that the number of Indonesian entrepreneurs in 2020 only reached 3.47 percent. Meanwhile, the entrepreneurial ratio needed to boost economic growth must reach 4 percent (Republika, 2020). High unemployment data support the low number of entrepreneurs, namely in 2020, it reached 6.88 million and was dominated by Vocational High Schools (SMK) graduates at 8.49 percent (Badan Pusat Statistik, 2020).

Based on this problem, the implementation of entrepreneurship education is an effective way to increase qualified entrepreneurs (Handayati, Wulandari, Soetjipto, Wibowo, & Narmaditya, 2020, p. 2; Karlusch, Sachsenhofer, & Reinsberger, 2018, p. 170). The Ministry of Education and Culture (Kemdikbud) seeks to innovate entrepreneurship education at the SMK level by applying the Creative Products and Entrepreneurship (PKK) subject. Government regulations listed in the 2013 Revised Curriculum Number 130 / D / KEP / KR / 2017 Article 8 explains that the application of PKK subject must be adjusted to the specifications of their respective fields of expertise. In accounting expertise, students must be able to create innovative products by utilising their accounting knowledge. However, the facts show that students' creativity in PKK subjects was still low (Kementerian Pendidikan dan Kebudayaan Indonesia, 2017).

The preliminary survey results on the creativity of students in PKK subjects showed that 43.75 percent of students had low creativity, 30 percent had medium creativity, and only 26.25 percent had high creativity. Students' low creativity is indicated by several unfulfilled indicators, such as: thinks outside the box, imaginative, ingenious, innovator, and the problem (Gralewski, 2019, p. 145). The formation of student creativity in PKK subjects is vital; as stated by Aldianto, Anggadwita, & Umbara (2018, p. 297); Morselli (2018, p. 807) and Wardana et al., (2020, p. 5), creativity is a mindset that teachers must instill so that students can build a sustainable business. Besides which, creativity also plays a role in developing students' innovative abilities in making a specific product (Camacho-Minano & Campo, 2017, p. 673; Kheng, 2017, p. 60; Kirkley, 2017, p. 30).

Creativity can be enhanced through several educational innovations (Wong, 2018, p. 181), such as using appropriate learning models, methods and media (Serdyukov, 2017, p. 8). Contrary to this opinion, Semmler, Uchinokura and Pietzner (2018, p. 4) put forward more specific innovations such as student-centered learning models, media, and teaching materials that are under each field of science. Sung, Chang and Liu (2016, p. 262) added some teaching materials that can be used, namely special modules according to each vocational program's needs. Students' modules must be systematic and follow the required competency to develop their creativity (Thomas & Nurkhin, 2016, p. 82).

In connection with the above statement, Watson, Pelkey, Noyes and Rodgers (2016, p. 547) argued that students need project-based modules that can be used as guidelines for honing creativity. The application of project-based modules can be implemented with project-based learning that can direct students to be more creative in completing a product (goods or services)

through an actual process (Pan, Seow, & Koh, 2019, p. 169; Susanti, Fitriani, & Sari, 2020, p. 2). As evidenced by Barak and Yuan (2021, p. 3), project-based learning can foster creative thinking by developing project ideas through making prototypes. Projects produced by students can be evaluated directly by teachers to measure the ability of creativity and group collaboration (Amamou & Cheniti-Belcadhi, 2018, p. 177; Sormunen, Juuti, & Lavonen, 2019, p. 19).

The use of project-based learning can produce optimal output if it is equipped with appropriate learning media. Bock, Bøgholm, Sestoft, Thomsen and Thomsen (2020, p. 1) stated that spreadsheets help most people complete finance work. Programs in spreadsheets can help manage financial and accounting data to make calculations easier. In line with this opinion, Frownfelter-Lohrke (2017, p. 68) revealed that spreadsheets could help make accounting designs for specific purposes. This design can be used for planning, budgeting and decision-making from the data obtained (Bahador, Haider, & Saat, 2018, p. 212).

The Creative Product and Entrepreneurship Module based on project-based learning and spreadsheets can be used to increase students' creativity. If creativity increases, it will encourage progress in education, which can impact sustainable economic growth (Dou, Zhu, Zhang, & Wang, 2019, p. 338; Kirkley, 2017, p. 18). The process of realising economic growth must be balanced with the implementation of entrepreneurship education to produce creative and excellent human resources (Jena, 2020, p. 2). Thus, the research's focus was to determine the effectiveness of the Creative Product and Entrepreneurship Module based on project-based learning and spreadsheets to understand students' creativity in the Accounting Expertise Sector at SMK Negeri 1 Surakarta.

## Literature Review

### *Creativity*

Creativity is a thought process in creating new ideas (Corfman & Beck, 2019, p. 2). This thought process will increase one's ability to see profitable economic opportunities (Campos, 2016, p. 460; Wardana et al., 2020, p. 5). The statement is consistent with Mehmood, Jian and Akram (2020, p. 1) who say that global competition and rapid technological developments require creative human resources to create new products or services in market share. Therefore, the implementation of entrepreneurship education must be complemented by an increase in the students' creativity to produce innovative and skilled attitudes in doing a sustainable business (Dentchev et al., 2016, p. 3; Karlusch et al., 2018, p. 170; Kheng, 2017, p. 156).

Students' creativity development can be done at all levels of education (Barroso-Tanoira, 2017, p. 56), one of which is at the SMK level through the PKK subject for producing qualified graduates (Nurmaliza & Caska, 2018, p. 44). In the subject, students must be able to develop creativity by relying on ideas and knowledge to create character or originality that is integrated

with the resulting product (Prastawa, Akhyar, Gunarhadi, & Suharno, 2019, p. 26). Techniques that can be used to develop students' creativity are those such as stated by Barroso-Tanoira (2017, p. 56) and Raymundo (2020, p. 108), namely brainstorming in developing ideas effectively and solving various kinds of real problems. Techniques that are carried out correctly will help students improve ideas, solutions, and innovations in developing certain products (Chang & Chen, 2020, p. 752; Kirkley, 2017, p. 30).

### ***Learning Modules***

Modules are teaching materials that can be used as guidelines, containing facts, concepts, procedures, and principles in learning materials (Thomas & Nurkhin, 2016, p. 82). The benefits of modules for students are supporting the learning process using a scientific approach to encourage critical thinking in solving problems (Hamzah & Mentari, 2017, p. 81). Modules also allow students to hone creativity and improve their skills (Rienties & Toetenel, 2016, p. 335).

In entrepreneurship learning, modules aim to improve students' entrepreneurial competence by developing creativity in making business products (Wahidmurni, Nur, Pusposari, & Yuliandari, 2020, p. 1048). As stated by Yulastri and Hidayat (2017, p. 1100), modules that can encourage students to make products are based on project-based learning so that students can complete products systematically. The material presented in the module is equipped with steps for structured learning activities that can be studied independently by students (Indriyani & Ramadhan, 2017, p. 17; Sefriani, Wijaya, Menrisal, & Dewi, 2020, p. 76). The various kinds of activities presented in the module can help students actively engage in making it easier to explore creativity (Mamun, Lawrie, & Wright, 2020, p. 3).

### ***Project-Based Learning Model***

Project-based learning is a project-based teaching method oriented towards real problems (Barak & Yuan, 2021, p. 4; Liu & Zhao, 2020, p. 7). This model's role in learning is to increase students' productive competence as per their respective areas of expertise (Jalinus, Nabawi, & Mardin, 2017, p. 252). In the PKK subject, students can develop their knowledge into a useful project. This is in line with the opinion of Parrado-Martínez and Sánchez-Andújar (2020, p. 1), who state that the project-based learning model is effective for use in the PKK subject because it helps hone teamwork skills. In addition, students become more productive because they can develop projects according to their disciplines (Chu et al., 2017, p. 50; Guo, Saab, Post, & Admiraal, 2020, p. 2).

Project-based learning model characteristics are developing creativity and encouraging cooperative collaboration to solve various kinds of problems and realise appropriate project designs (Chiang & Lee, 2016, p. 709). The process of making a project design can help train students to design, analyse and apply their ideas so that they can foster a creative thinking

process (Usmeldi, 2018, p. 16). Learning using this model also makes it easier for teachers to measure students' creativity through making project designs (Sormunen et al., 2019, p. 19).

### ***Spreadsheets***

Spreadsheets are software that can be used for financial analysis to process computerised financial and accounting information (Ojua, 2016, p. 781). Spreadsheets are used mainly by MSMEs (Sani, Wiliani, & Husain, 2019, p. 1), one of which is uses is to calculate finances related to profit/loss earned in each period (Willis, 2016, p. 93). Students can take advantage of these media to make innovative products related to their accounting knowledge. The design of accounting products that can be developed, such as designing financial statements, are namely income statements, statements of changes in equity, statements of financial position, and cash flow (Afif & Nawirah, 2020, p. 141; Ariana, Bagiada, & Sukayasa, 2018, pp. 450–451). In addition, spreadsheets function to enter sales and purchasing data and analysis to increase competitiveness (Jusoh & Ahmad, 2019, p. 24).

### **Method**

This type of research is quasi-experimental research. Sugiyono (2017, p. 77) explained that quasi-experimental research is research used to determine the difference between two or more variables used in the research subject. This study aimed to determine the effectiveness of applying the Creative Product and Entrepreneurship Module based on project-based learning and spreadsheets to improve students' creativity. The test design used was a nonequivalent control group design. This design was done by comparing pre-test and post-test scores for the control class and the experimental class.

This research was conducted at SMK N 1 Surakarta. The class equality test determined the experimental and control classes, which aimed to determine that the two classes used have balanced results (Budiyono, 2016, p. 157). Based on the equivalence test results, it was determined that the experiment class was Class XI Accounting 2 and the control class was Accounting Class 3. The techniques used in this study were questionnaires and written tests. The instrument used was a test item to measure the creativity of students.

The module's effectiveness was tested using the t-test to determine the differences in students' creativity between the experimental and control classes. If the significance is  $\leq 5\%$ , then there is a significant difference between the two classes, so the Creative Product and Entrepreneurship Module application based on project-based learning and spreadsheets is effective for being used to increase students' creativity. The t-test must meet the prerequisite tests, namely the normality test and the homogeneity test. The normality test using the Shapiro-Wilk aims to determine that the data is typically distributed. Data are normally distributed if

the significance is  $> 5\%$ , while the homogeneity test is to find out whether or not the sample from the population has homogeneous data. Data are homogeneous if the significance is  $> 5\%$ . Calculation of the t-test that has been done can be combined with the N-Gain Score calculation. The combination aims to measure the increase in students' creativity scores during the pre-test and post-test using the Gain Normality Test (Hake in Sundayana, 2014, p. 151). The interpretation of the N-Gain index is as follows:

Table 1. Interpretation of N-Gain Index

<b>N-Gain Score</b>	<b>Interpretation</b>
$-1,00 < g < 0,0$	Decrease
$g = 0,0$	Stable
$0,0 < g < 0,30$	Low
$0,30 < g < 0,70$	Average
$0,70 < g < 1,00$	High

Source: Hake in Sundayana (2014, p. 151)

## Result and Discussion

The effectiveness test of applying the Creative Product and Entrepreneurship Module based on project-based learning and spreadsheets must meet the test prerequisite, namely the normality test and homogeneity test. The normality test is used to determine that the data used are normally distributed. The normality test used the Shapiro-Wilk because the number of class samples was less than 100. The normality test results for the experimental class at the pre-test were 0.09 and 0.145 at the post-test. Meanwhile, the control class was 0.079 at the pre-test and 0.295 at the post-test. This showed that the significance of the experimental and control classes was more than 5%, meaning that the data were normally distributed.

Furthermore, the homogeneity test was carried out to find out that the data used was homogeneous. The results of the homogeneity test at the pre-test were 0.072 and post-test 0.103. This shows that the pre-test and post-test significance was more than 5 percent, meaning that the data is homogeneous. The next stage is the t-test to determine the differences in students' creativity before and after treatment. Following are the results of the t-test that has been carried out, as follows:

Table 2. T-test Result

Group	t	Df	Sig. (2 tailed)	Mean Difference	Std. Error Difference
Experiment	6.651	64	.000	15.184	2.283
Control	6.596	57.887	.000	15.184	2.302

Source: Processed data (2021)

Table 2 shows a significance value of  $\leq 5\%$ , which means that there were significant differences in students' creativity before and after treatment in the two groups. The t-test result shows a significance value of 0,00. Therefore, applying the Creative Product and Entrepreneurship Module based on project-based learning and spreadsheets effectively increases students' creativity. Based on these data, the score of increasing students' creativity can be measured using the N-Gain Score. The results of the N-Gain are as follows:

Table 3. N-Gain Score

Group	N-Gain Score	Interpretation N-Gain	Df
Experiment	0,71	High	64
Control	0,40	Average	57,887

Source: Processed data (2021)

Table 3 shows that the increase in students' creativity in the experimental group was in the high category (N-Gain value = 0.71). The results above show that applying the Creative Products and Entrepreneurship module based on project-based learning and spreadsheets has effectively increased students' creativity. The increasing average value of N-Gain indicates the increase in creativity. This is relevant to the explanation of Yulastri and Hidayat (2017, p. 1100), that the project-based learning module directs students systematically to complete a product. This learning will help students foster creativity in creating creative products. Modules are also used as supporting teaching materials that provide opportunities for students to learn entrepreneurial concepts to foster an entrepreneurial spirit. The purpose of using this module is to improve students' entrepreneurial competencies, such as developing creativity, skills, critical thinking and problem-solving skills (Wahidmurni et al., 2020, p. 1048).

The use of modules supports the learning process using a scientific approach, which is to present a problem that encourages students' creative and critical thinking to complete modules and are also used to evaluate students' abilities with several structured tasks presented within it. Presentation of assignments given both independently and in groups aims to encourage students to think creatively. Therefore, the use of modules that are systematic and following the needs of each academic level is very necessary in order to be able to achieve these goals

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(Thomas & Nurkhin, 2016, p. 82).

Implementing project-based learning in the learning module can encourage students' creativity in the PKK subject. Barak and Yuan (2021, p. 3) revealed that project-based learning trains students' creative thinking through the making of prototypes. The benefits obtained by students are that they can raise problems authentically and find solutions to solve them. This model is effectively used in the PKK subject because it helps hone the teamwork, communication and creativity skills of students (Parrado-Martínez & Sánchez-Andújar, 2020, p. 1). Additionally, Chu et al., (2017, p. 50) and Guo et al., (2020, p. 2) explain that project-based learning involves students producing productive workgroups through the development of a real project under science learned.

The use of spreadsheets in the module also has an important role in helping students make products according to their accounting expertise. The resulting product is in the form of an accounting service design for MSME players. Some examples of accounting designs are financial statement designs, such as income statements, statements of changes in equity, statements of financial position, and cash flow (Ariana et al., 2018, pp. 450–451). The use of spreadsheets in the module also has an important role in helping students make products according to their accounting expertise. The resulting product is in the form of an accounting service design for MSME players. Some examples of accounting designs are financial statement designs, such as income statements, statements of changes in equity, statements of financial position, and cash flow (Sani et al., 2019, p. 1). Students can identify the making of accounting designs needed by business actors to facilitate the recording of transactions carried out. The knowledge learned in accounting can be implemented with spreadsheets so that accounting records design is created according to applicable rules and has a selling value in society.

Learning using the Creative Products and Entrepreneurship module based on project-based learning and spreadsheets helps students achieve creativity per required competency. This module encourages students to study entrepreneurship in the field of accounting and complete the given project tasks. These tasks motivate students to think creatively in creating accounting service products. Entrepreneurship material arranged in modules is adjusted to Core Competencies (KI) and Basic Competencies (KD) in the 2013 Revised Curriculum. The learning process using this module increases interaction between fellow students, namely, the exchanging of ideas and opinions. This can be seen during discussions in project development. Another benefit is that students can learn independently with the assistance of a teacher who is in charge of directing and monitoring the ongoing learning process.

The use of the Creative Products and Entrepreneurship Module is also a form of contribution to encouraging education progress. The implementation of entrepreneurship education in schools can help sustain economic growth, for example, by creating new jobs. The process of realising this economic growth requires creative resources to create various kinds of





innovations. Jena (2020, p. 2) stated that applying an entrepreneurial mindset among students through entrepreneurship education is the right step to meet current needs. Various countries recognise that entrepreneurship education can help increase productivity, competitiveness and improve quality of life. Therefore, students, as the nation's successors, must have a creative attitudes, in order to be able to create a valuable product under the field being studied.

## **Conclusion**

The Creative Product and Entrepreneurship Module based on project-based learning and spreadsheets is effective to be used for the learning process in the field of accounting expertise. The module effectiveness test using the t-test showed a significant difference between before and after treatment, with a significance value of 0.00. This shows that the application of the module can be effectively used for learning guidelines for students. The increase in creativity that occurred was included in the high category in the experimental class with an N-Gain value of 0.71. Based on these data, applying the Creative Product and Entrepreneurship Module based on project-based learning and spreadsheets effectively increases students' creativity.

## **Contribution/Originality**

The use of modules in PKK learning can increase students' creativity, according to the provisions of the 2013 revised curriculum, to create innovative products per the disciplines being studied. Increased creativity is one of the competencies needed in the 4.0 era, making it easier for students to create future opportunities. In education, creativity is essential to produce graduates who are competent as per their expertise, and can improve the quality of learning. In the economic sector, creativity has a contribution in growing the number of Indonesian entrepreneurs, reducing unemployment and the level of poverty that occurs.

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