



# Analysis of the Implementation of the Contextual Science Teaching Factory Learning Model at the Medan City Center of Excellence Vocational School

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**Abstract:** This research aims to describe and determine the implementation of the Contextual Science Based Teaching Factory learning model at the Medan City Center of Excellence Vocational School and the factors inhibiting the implementation of the Contextual Science Based Teaching Factory learning model at the Medan City Center of Excellence Vocational School. This research is a qualitative descriptive study. The subjects in this research were 10 teachers who taught, 10 industrial partners and. and 25 class XI students at the Excellence Central Vocational School, Medan City. Data collection techniques were carried out using unstructured interviews and closed questionnaires. Before the research instrument is used, a validity test is first carried out using the Pearson Product Moment Correlation formula and a reliability test using the Cronbach's Alpha formula. The results of this research found that in the Context aspect it went well, in the Input aspect it went well and in the Process aspect it also went well but in the Product aspect it still went less well. Through this research it is hoped that the role of the stakeholders will be more optimal so that the Teaching Factory learning model is Contextually Based Science can proceed according to expectations.

**Keywords:** Contextual science; Factory learning model; Teaching Factory

## Introduction

The Teaching Factory learning model has advantages, namely the Teaching Factory learning model with production can produce products/services that are ready to be sold and can increase school income which can be used to help finance school operations and can be used as a tool for school promotion in the environment (Azizah et al., 2019; Junaedi et al., 2024). The teaching and learning process becomes much more enjoyable because the practice is the same as the industry that produces the product/service (Bunyamin, 2023; Mourtzis, 2018), thus making teachers and students more enthusiastic because the results of the practical product can be used as material for practical

tools. Teachers are also more enthusiastic about teaching, because they have time to play a greater role in their abilities during practicum, and have a sense of pride in the results that students get from the products/services they produce (Puspita et al., 2020; Wahjusaputri & Bunyamin, 2022). This Teaching Factory can produce skilled workers for industry who are ready to work and can minimize training costs in industry (Maryanti et al., 2020; Zawadzki et al., 2020). Apart from that, industry can also play a positive role in efforts to develop human resources in an effort to improve the quality of education, especially vocational education.

Apart from the shortcomings of the Teaching Factory learning model, namely Lack of human resources managing the Teaching Factory (productive

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subject teachers) especially related to personnel changes (transfers, etc.) (Mourtzis et al., 2023). Formation of student character that needs to continue to be improved so that they can serve/produce industry standard products. Limited land for implementing the Teaching Factory, insufficient practice space, unable to provide an outlet to showcase products. Promotion/marketing is still limited to certain groups. Products/services still depend on orders. There is no strong legal umbrella for the implementation of the Teaching Factory, which can create a sense of security for school principals and teachers in implementing the Teaching Factory in Vocational Schools (Suryanti, 2024; Watini, 2024).

There are four aspects of the Teaching Factory according to Imran (2023), namely, context aspect, input aspect, process aspect and product aspect. After testing the relevant theories, we then review several previous studies that are relevant to this research. Research conducted by Abdullah (2021), on increasing student competency through the teaching factory learning model in productive vocational school subjects in East Aceh. The research results show that the Teaching Factory learning model can produce constructive contributions in partnerships between vocational schools and industry (Roll & Ifenthaler, 2021). The results of the research show that the implementation of the Teaching Factory still boils down to the school, in this case teachers in their learning activities carry out Teaching Factory-based learning procedures (Product Based Education Training) necessary and, after identifying the condition of each competency to be developed, then determine a physical and non-physical development plan. Furthermore, research conducted by Prasloranti et al. (2021), regarding Evaluation of the Implementation of the Teaching Factory Learning Model at SMKN 1 Cibadak. The research results show that the implementation of the Teaching Factory in terms of product components is stated to be very suitable for the products produced and the competencies obtained by students.

## Method

This research was carried out at the Medan City Center of Excellence Vocational School. The data collection instrument was interviews with teachers and students carried out at the Medan City State Vocational School. The research period was from February to July 2024 to June 2023. This research treatment lasted for 6 meetings.

The subjects in this research were 10 teachers who taught 25 students in class XI at the Center of Excellence Vocational School and 10 people from partner industries in Medan City. The method used in this research is R&D

with a qualitative and quantitative descriptive approach. According to Moleong (2012) that qualitative research is research that intends to understand phenomena about what is experienced by research subjects, for example behavior, perceptions, motivation, actions, etc. Holistically and by means of descriptions in the form of words and language, in a special natural context and by utilizing various natural methods. Meanwhile, according to Sugiyono (2017) the qualitative research method is a method based on the philosophy of postpositivism, used to research the condition of natural objects, where research is an important instrument, data collection techniques are carried out in a triangulated manner, data analysis is inductive/ qualitative, and the results of qualitative research emphasize meaning over generalization.

In this research, we will examine in more depth the implementation of the Teaching Factory learning model based on contextual science. In its implementation, images and descriptions were searched for students and teachers at the Medan City Center of Excellence Vocational School, and Teaching Factor Partners from Industry to serve as research subjects.

The data source in this research is an important subject from which data can be obtained. According to Moleong (2012) the main data sources in qualitative research are words and actions, the rest are additional sources such as documents and so on.

In this research, primary data is used as the main data, namely the results of interviews and observations. Meanwhile, secondary data is used as supporting data, namely available documentation and report data.

According to Sugiyono (2022) data collection can be done in various settings, various sources and various ways. The data collection procedure is the most important step in research, because the main aim of this research is to obtain data. To obtain data that is accurate and ready to be accounted for, in this research the author collected data collection procedures, namely, interviews; questionnaire; observation; and documentation.

According to Sugiyono (2022), data analysis techniques in quantitative research are clear, namely they are directed at answering the problem formulation that has been formulated in the proposal. Because the data is quantitative, the data analysis technique uses available statistical methods. In this research, the data technique used is calculating frequencies to determine the percentage of each aspect in order to get an idea of the contribution of each aspect to the overall context studied. According to Winarsunu (2017), the score follows Formula 1.

$$P = \frac{f}{N} \times 100\% \quad (1)$$

With description:

P = percentage

f = number of subjects in a particular category

N = total frequency or total number of subjects.

## Result and Discussion

### Implementation of the Teaching Factory Learning Model

Analysis data on the implementation of the Contextual Science-based Teaching Factory learning model was obtained from interview data, questionnaires and observations which were organized into 4 question aspects, namely context, input, process and product aspects, consisting of 30 questions given to 10 Engineering subject teachers and 29 questions given to 25 class XI Engineering students. With questions that are appropriate to the implementation of the Teaching Factory learning model. Based on questionnaire analysis using manual calculations using the Excel application, there were 10 teacher respondents and 25 student respondents who filled out the questionnaire with 4 aspects, namely Context, Input, Process and Product.

### Achievement of Context Aspects in Teachers

In the Context aspect there are a total of 8 questions filled in by 10 teacher respondents. In total, the Context aspect received 20 respondent votes (25%) who strongly agreed, 55 respondent votes (68.75%) who agreed, 5 respondent votes (6.25%) who disagreed. With a total of 80 respondents' votes as in Figure 1.

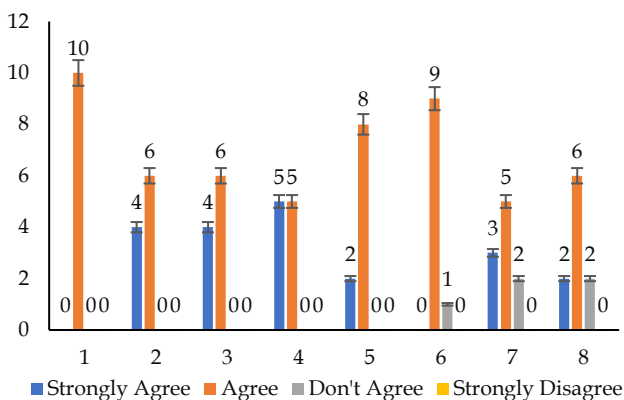


Figure 1. Teachers' achievement of context aspects

In this case, the Context aspect has been established for the school that the school is ready with the Teaching Factory learning model in order to meet the demands of graduates from vocational schools, namely graduates who are ready to work and be used in the industrial world. In context, SMK Negeri 2 has fulfilled and is very suitable for the Teaching Factory learning model as seen from the readiness of the school and teachers.

### Achievement of Input Aspects for Teachers

In the Input aspect there are a total of 7 questions filled in by 10 teacher respondents. In total, 13 respondents' votes (18.57%) strongly agreed, 55 respondents' votes (78.57%) agreed, 2 respondents' votes (2.85%) disagreed. With a total of 70 respondents' votes as seen in Figure 2.

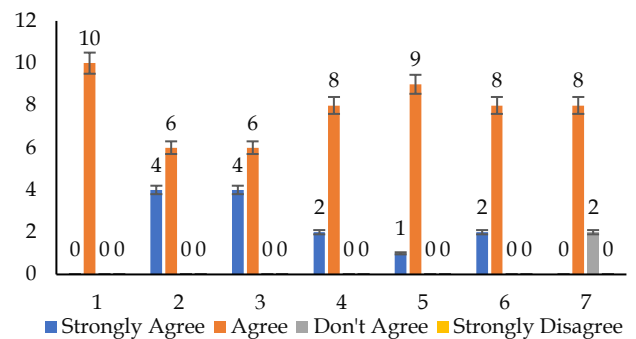


Figure 2. Achievement of input aspects for teachers

In this case, the input aspect has been assigned to the head of the department and also the teachers who teach, especially during practice, where the school has provided workshop facilities and complete management during practice is handed over to the teacher, where groups of students are formed so that the practice goes well. This is done because there is a shortage of existing machines but can be controlled by creating groups of students and arranging practical entry schedules so that everyone can carry out practical hours and can even add more practical hours to students.

### Achievement of Process Aspects in Teachers

In the Process aspect there are a total of 8 questions filled in by 10 teacher respondents. In total, the Process aspect received 22 respondents' votes (27.5%) who strongly agreed, 54 respondents' votes (67.5%) agreed, 4 respondents' votes (5%) disagreed. With a total of 80 respondents' votes as seen in Figure 3.

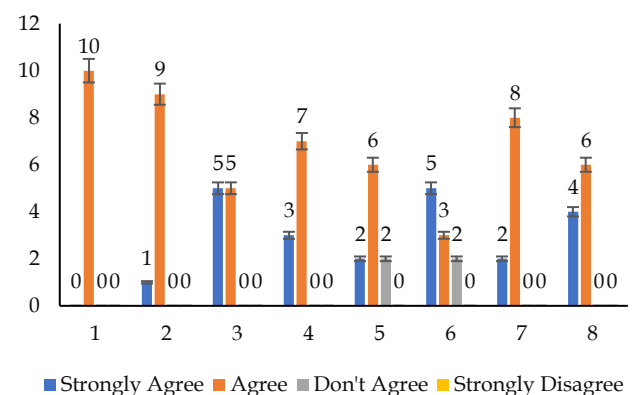


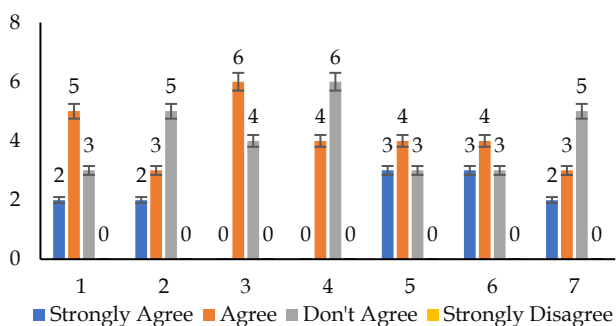
Figure 3. Teacher achievement of process aspects

After the explanation above, it can be seen that the Process aspect for teachers in implementing the Teaching Factory learning model at SMK Negeri 2 Medan has been implemented well with the number of votes strongly agree and agree getting the highest score.

This is influenced by the formation of student groups, teachers continue to supervise and continue to exercise control so that it continues to run well and teachers continue to manage students' time in practice and remain disciplined regarding time. This can be seen in the PKL program for students at SMK Negeri 2 Medan which is a process in there is no doubt about industrial practices and work because they are used to existing ways of working and time management.

*Achievement of Product Aspects among Teachers*

In the Product aspect, there were a total of 7 questions filled in by 10 teacher respondents. In total, the Product aspect received 15 respondents' votes (21.42%) who strongly agreed, 35 respondents' votes (50%) agreed, 20 respondents' votes (28.57%) disagreed. With a total of 70 respondents' votes. As in the following image.



**Figure 4.** Teachers' achievement of product aspects

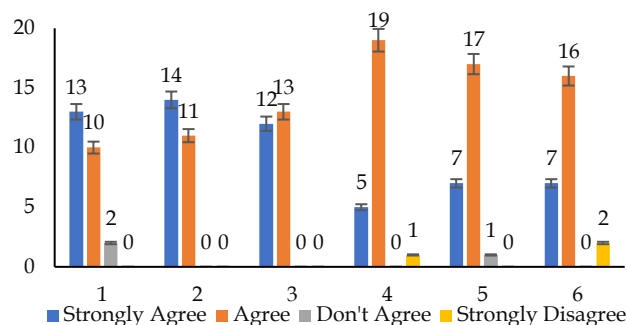
After the explanation above, it can be seen that the Product aspect for teachers in implementing the Teaching Factory learning model at SMK Negeri 2 Medan is still in the adequate category in its implementation with the number of votes for disagreeing still getting a fairly high score.

This is in line with what Rukmana et al. (2021) said, who is one of the practical teachers at SMK Negeri 2 Medan, where the industry does not yet trust the school, so the industry only trusts the school only to the level of being a partner for street vendors. Previously there had been industry that came but only became guest teacher from Bengkelan Setia and only a few months.

Therefore, schools still need to increase industry confidence so that this aspect can run well and can partner with industry, which has a big influence on vocational school graduates who could be attracted by the industry itself.

*Achievement of Context Aspects in students*

In the Context aspect there are a total of 6 questions filled in by 25 student respondents. In total, the Context aspect received 66 respondents' votes (44%) who strongly agreed, 76 respondents' votes (50.66%) agreed, 8 respondents' votes (5.33%) disagreed. With a total of 150 respondents' votes as seen in Figure 5.



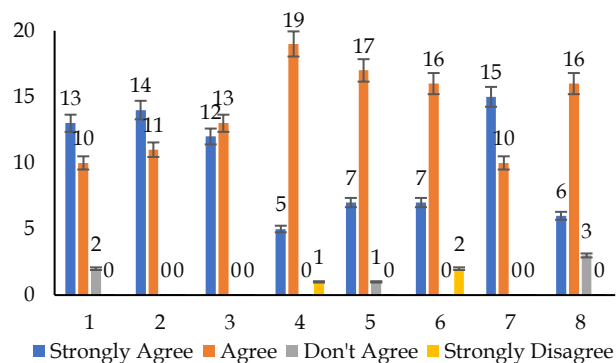
**Figure 5.** Achievement of context aspects among students

After the explanation above, it can be seen that the Context aspect for students in implementing the Teaching Factory learning model at SMK Negeri 2 Medan has been implemented well with the number of votes strongly agree and agree getting the highest score.

In the context aspect, students being able to run well is inseparable from the students' understanding which is provided by supervising teachers whose clear goal is to enter the industrial world. So at SMK Negeri 2 Medan it can run well because students and teachers already understand each other's initial context of the Teaching Factory learning model.

*Achievement of Input Aspects for students*

In the Input aspect there are a total of 8 questions filled in by 25 student respondents. In total, the Input aspect received 79 respondents' votes (39.5%) who strongly agreed, 112 respondents' votes (56%) agreed, 6 respondents' votes (3%) disagreed, 3 respondents' votes (1.5%) chose strongly disagree. With a total of 200 respondents' votes as seen in Figure 6.



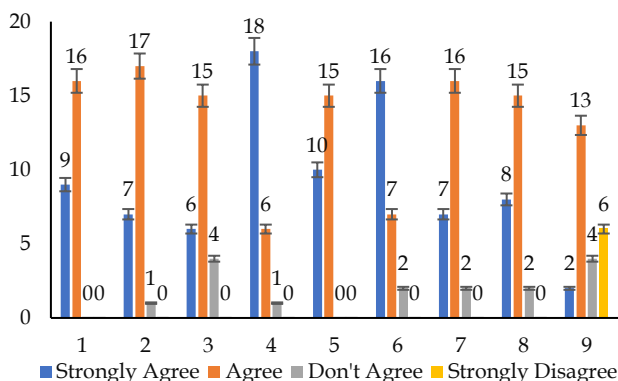
**Figure 6.** Achievement of input aspects among students

After the explanation above, it can be seen that the input aspect for students in implementing the Teaching Factory learning model at SMK Negeri 2 Medan has been implemented well with the number of votes strongly agree and agree getting the highest score.

The input aspect can also be implemented well, inseparable from the teacher's previous understanding that the main objective of the Teaching Factory learning model is to enter the world of the food industry. Preparations must also be given understanding such as working in groups and managing time in the process so that students at SMK Negeri 2 Medan Indeed, from the start, we were given good guidance from the supervising teacher.

*Achievement of Process Aspects in students*

In the Process aspect there are a total of 9 questions filled in by 25 student respondents. In total, the Process aspect received 83 respondents' votes (36.88%) who strongly agreed, 120 respondents' votes (53.33%) agreed, 16 respondents' votes (7.11%) disagreed, 6 respondents' votes (2, 66%) chose to strongly disagree. With a total of 225 respondents' votes. As in the following image.



**Figure 7.** Achievement of process aspects among students

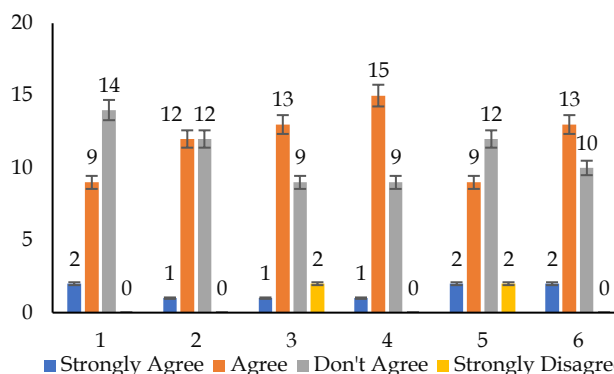
After the explanation above, it can be seen that the Process aspect for students in implementing the Teaching Factory learning model at SMK Negeri 2 Medan has been implemented well with the number of votes strongly agree and agree getting the highest score.

This aspect is supported because the school, in this case the teacher, pays attention to preparations in practice such as material that combines normative, adaptive and productive content and pays attention to the practice space that will be used during Teaching Factory learning model activities. Discipline of time and facilities such as materials and tools can also be fulfilled even though they have to be in groups and sharing practical time, but this also makes students able to carry out aspects of the process well. This is proven when

students do PKL students are already used to these things and there is no doubt about it work process.

*Achievement of Product Aspects in Students*

In the Product aspect, there were a total of 6 questions filled in by 25 student respondents. In total, the Product aspect received 9 respondents' votes (6%) who strongly agreed, 71 respondents' votes (47%) agreed, 66 respondents' votes (44%) disagreed, 4 respondents' votes (3%) strongly disagreed. With a total of 150 respondents' votes. As in the following image.



**Figure 8.** Achievement of product aspects among students

After the explanation above, it can be seen that the Product aspect for students in implementing the Teaching Factory learning model at SMK Negeri 2 Medan is still in the adequate category in its implementation with the number of votes for disagreeing still getting a fairly high score.

As with teachers, this aspect of the product also does not work well for students. This is in line with Rukmana et al. (2021) said, who is one of the practical teachers at SMK Negeri 2 Medan, where the industry does not yet trust the school, so the industry only trusts the school only to the level of being a partner for street vendors. Previously there had been industry that came but only for training teacher and only a few months.

Therefore, schools still need to increase industry confidence so that this aspect can run well and can partner with industry, which has a big influence on vocational school graduates who could be attracted by the industry itself. Students must also be able to increase industry confidence during the PKL.

*Description of the Implementation of the Teaching Factory Learning Model at SMK Negeri 2 Medan*

In implementing the Teaching Factory learning model, it can be concluded that the Teaching Factory learning model is a learning model that focuses on production practices and is carried out at school which makes students feel like they are learning directly or working directly in industry with the aim that students can be immediately ready to work in the industrial

world (Miladiyah et al., 2021; Muassar, 2018). In the process of implementing the Teaching Factory, the curriculum that will be used must be contextually adapted to the demands of the needs and rapid development of industry and schools must also be equipped with facilities that support the implementation of the Teaching Factory learning model.

At SMK Negeri 2 Medan, which has been researched, the implementation of the Teaching Factory learning model refers to student competency, student preparation in the work process and refers to the results of the work objects which become practical material to complete the assignment. The method used is to give orders that require students to analyze and provide understanding in fulfilling existing order requests, while the supervising teacher himself supervises and provides understanding if an error occurs during the practice process and provides solutions to students. The preparations made in carrying out the Teaching Factory learning model are the physical preparation of students and an initial understanding of the objectives of the Teaching Factory learning model, such as preparing product drawings by making work steps, selecting the work objects to be made and then being able to carry out the practical implementation itself (Widarto et al., 2012).

In its implementation, it cannot be separated from the role of the teacher who supervises and evaluates the student's work starting from the preparation stage, process and results of the practice. The assessment system carried out in the Teaching Factory learning model at SMK Negeri 2 Medan places more emphasis on the practical process stage of the students themselves. For schools, students are required to have skills or abilities during the process, not the results. Assessment is carried out starting from the preparation process such as making job sheets, student work safety through the use of machines and tools with a larger portion in the assessment system of around 45% and the results of the process are assessed at 35% because the school considers that if the process has gone well then the results will also Good. Because in the results there will be an evaluation regarding the shape of the existing work object or defects in the object. Later improvements will be made and education will be provided to students to improve and learn more about the work process (Kristanto et al., 2023; Subekti et al., 2019).

Students at SMK Negeri 2 Medan are also very motivated to practice, especially if there is a new work piece for example threading and so on, they are very enthusiastic because they are also aware that vocational schools are required to be more in the field of practice. Factors that often become obstacles in implementing the Teaching Factory at SMK Negeri 2 Medan include the insufficient number of machines, even though SMK

Negeri 2 Medan has a large number of machines, namely 13, but because the number of students is large, sometimes the number of machines is not enough, so that's why This can be overcome by forming several groups of students and dividing the machines and creating time discipline in practicing. There are also external factors such as electricity, for example, power outages and lack of electric current from PLN and damage to the machine itself as a factor inhibiting practice so that practice cannot be carried out.

The implementation of the Teaching Factory learning model is very beneficial for vocational schools because students are required to master certain competencies so that there is a selling price not only regarding the results but also the selling price of the work process of the students (Kautsar et al., 2022; Yoto et al., 2024). The simplest example is the process carried out during the PKL where you can see the results of the process. The Teaching Factory learning model itself is because the Teaching Factory learning model is competency-based which requires students to analyze and process so that there are appropriate results. It is hoped that the opportunity to implement the Teaching Factory at SMK Negeri 2 Medan will improve, especially the role of industry which is expected to play a greater role. If you look again, the implementation of the Teaching Factory learning model at SMK Negeri 2 Medan has not been implemented well, but SMK Negeri 2 Medan already has an initial foundation. which needs to be developed for the following years, such as the initial goal of the Vocational School itself which hopes that students will graduate and be ready to use or work in industry (Bakar et al., 2023).

Industrial relations or cooperation between Vocational Schools and Industry is the key in implementing the Teaching Factory (Handayani et al., 2019; Sulistyio et al., 2019), but in its implementation at SMK Negeri 2 Medan the role of Stakeholders is still not well established for problems like this in the province of North Sumatra, especially the city of Medan, which is still a very complicated problem. Stakeholders are still less because the orders for objects that come to the school are a little less significant, almost non-existent, because it is possible that the Stakeholders don't want to cooperate with Vocational Schools to carry out the work, but they are committed to accepting the students themselves based on their existing skills. But once there was a guest teacher who came to SMK Negeri 2 Medan, the guest teacher functioned to provide learning to students at the school, the guest teacher who came was from Perbengkelan Setia for stakeholders who may have existed. So in essence the role of Stakeholders at SMK Negeri 2 Medan.

## Conclusion

Based on the data obtained from the results of the research that has been carried out, it can be concluded that: the implementation of the Teaching Factory learning model implemented at SMK Negeri 2 Medan is going well in various aspects such as Context, Input and Process, but the Product aspect still needs improvement. The implementation of the Teaching Factory learning model at SMK Negeri 2 Medan has been going well but still really needs a stakeholder role. To improve the implementation of the Teaching Factory learning model, it is better to pay more careful attention to the existing system in the school so that it is implemented well and to improve the product aspect in implementing the Teaching Factory learning model, it is better to provide the role of related industries.

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## Author Contributions

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## Conflicts of Interest

The authors declare no conflict of interest.

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