Industrial work culture education in Indonesian vocational high schools: Teachers' perceptions and practices

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Industrial work culture education (IWCE) is an important component in creating vocational school graduates who are competent and able to adapt quickly in the workplace. The implementation of IWCE has not been widely studied, so this study aims to describe Indonesian vocational high school teachers' perceptions and practices concerning IWCE. This study is a phenomenological qualitative research with automotive teachers from public and private VHS that have been accredited A in the Special Region of Yogyakarta and Central Java, Indonesia. Data were collected using interview techniques, analysed using the method presented by Creswell and Poth (2019). Analysis was assisted by *Atlas Ti* software to code, determine themes and relationships between themes, and determine the conclusions of the study. Results show that (1) types of IWC applied in VHS vary and their application is not optimal; (2) teachers have a central role in the educational pattern of IWC in VHS; (3) each school has different strategies for implementing IWCE; and (4) obstacles have been identified in school aspects, regulations, teachers, infrastructure, industry and costs.

Introduction

The competence of vocational high school (VHS) graduates in Indonesia has not been able to meet the expectations of the industry. The high unemployment rate of VHS graduates is one of the indicators (Prianto et al., 2021). Numerous elements influence this condition. One of the important factors that is the main cause is the large learning gap between VHS and the demands of jobs in the industry (Flynn et al., 2016). The government has made efforts to close this gap through a number of initiatives, including the VHS center of excellence program, teacher upskilling and reskilling programs, competency certification for teachers and students, and industrial internship programs for both students and teachers (Kemdikbud RI, 2021). Vocational education should not be too much of a barrier with industry, so that both parties can benefit from each other and be able to achieve their respective goals (Akkerman & Bakker, 2011), although it cannot be implemented perfectly because education and industry have different goals and not all of these can be synchronised.

Industrial work culture education (IWCE) is an important component in preparing the work readiness of VHS graduates (Nisula & Metso, 2019). Industrial work culture (IWC) is a value, norm and rule that is established or becomes a mutual agreement that can influence the thinking, behaviour, and interaction patterns of employees in working to achieve the goals of an industry (Ashkanasy et al., 2011; McLoughlin & Miura, 2017). VHS graduates are not only expected to be skilled in carrying out a specific job according to their field of expertise, but must also be able to quickly adapt to conditions, job demands, and work climate in the industry (James, 2010). Therefore, IWCE at VHS is very

important to produce competent graduates who can integrate quickly with a new team and work environment.

The low quality of IWCE can lead to a significant gap between the competence of graduates and the industry's expectations of a professional workforce. A strong IWC can enhance a VHS graduate's employability in the workplace (Ismara et al., 2020). New workers who are not familiar with the work culture of the industry mostly take a longer time to adapt and give up easily when there is a change in job demands (Prianto et al., 2021).

IWCE has almost the same characteristics as character education. It cannot be taught in a short time because it requires internalisation with sufficient time for every activity carried (Ismara et al., 2020). In addition, it cannot be implemented in special subjects, but it needs to be integrated with existing subjects, especially those related to vocational competencies. Support from schools to realise good IWCE is very important because there is a need for infrastructure and rules in schools that reflect the job and work climate in the industry (Berner, 2010).

The traditional issue with vocational education, particularly VHS, is that it cannot keep up with the industry infrastructure due to the quick growth of technology (Pambayun et al., 2020). Although it cannot fully describe the condition of the industry, at least the existing infrastructure can be optimally utilised to train competencies and provide a basis for understanding and habituation for students related to IWC. Basic provisions related to the work culture can be developed when the student is carrying out internships or work after graduation (Choy & Sappa, 2016).

Work culture education will not be optimal when relying solely on the implementation of internships or school visits to industry. Students need to be given a solid foundation related to the work culture of the industry to optimise the implementation of an internship (Nisula & Metso, 2019). Industry has its main orientation towards profit, so in carrying out internships, students must have a strong foundation, especially related to their work culture (Flynn et al., 2016). Industry has targets that must be met to be enable businesses to run and make profits. The presence of interns who do not have sufficient skills and knowledge related to IWC can interfere with production processes and work in industry. Therefore, to maintain good relations with industry, schools must be able to prepare their students so that they can adapt quickly to the demands of work in an industry (Billett, 2014).

IWCE applied in automotive VHS can adopt the work culture applied in the automotive industry. The dimensions and elements of the IWC need to be clearly identified so that it can be integrated and implemented by teachers and students at a VHS. Until now, there have been no guidelines for teachers to integrate IWCE at an automotive VHS. Current conditions cause IWCE to vary greatly depending on the understanding and experience of teachers, which is exacerbated by many VHS teachers not having sufficient experience in industry (Goh & Zukas, 2016). Therefore, optimising the implementation of IWCE in

VHS requires comprehensive efforts and steps involving schools, the industry, and the government (Flynn et al., 2016).

The quality condition of VHS in Indonesia is very varied, some VHS being superior, but others are left behind with implementations of learning being far below expectations. Superior VHS usually have stronger cooperation with industry, so that industry contributions to learning can be better categorised. Good synergy will benefit both parties because industry also has an interest in getting competent prospective workers who can meet its expectations (Gamboa et al., 2021). Guidelines related to IWC to be implemented in an automotive VHS are very important, so that every school, both public and private, can use them to improve the quality of learning and graduates.

IWCE in VHS needs to be explored considering the absence of guidance from both the Ministry of Education and schools, including the obstacles. This study was conducted to answer the research question, "What are Indonesian automotive VHS teachers' perceptions and practices concerning industrial work culture education?". The results of this study can later be used as a basis for further developing the quality of learning and graduate competence in automotive VHS.

Literature review

The importance of industrial work culture education in vocational high school

Culture is defined as an understanding of "the way we do things around us" and characterised by shared beliefs and visions, rituals and ceremonies, and communication networks (Deal & Kennedy, 1983), and shared assumptions, values, or norms (Ashforth, 1985). When viewed in the context of an industry that is an organisation, culture is a tradition of people who have learned and obtained social acceptance in an organisation. Everyone learns what is socially and professionally acceptable in an organisation, and this encourages their thinking, behaviour, and interaction patterns (McLoughlin & Miura, 2017).

Work culture can affect the performance of an industry, so usually a strong industry also has a strong work culture and consistent implementation (McLoughlin & Miura, 2017). The consequence is that every new worker, or in this case, VHS graduates, must have a basic knowledge or even mastery of the IWC that exists in their field. The lack of provisions related to this can lead to a long adjustment time in the industry. Company managers today want to get employees who have internalised the company's values and their functional roles so they can reduce the cost of errors and training new workers (Fetherston, 2017).

IWC needs to be introduced to VHS students because mastering it requires habituation and a long period of time (Ismara et al., 2020). Moreover, the characteristics of the current younger generation may be perceived as not being able to follow a good IWC because, (1) they cannot stay focused for a long time; (2) they are oriented towards personal growth in a comfortable work environment with flexible schedules and well-known brands; and (3)

they don't want career growth, a liberal workplace, a flat organisation, and a lot of incentives (Kucherov et al., 2019). Obviously, employers are not happy with such scenarios for young workers, especially in organisations with very long distances between their managerial levels, standard operating procedures, and strict requirements of responsibility (Zakharova et al., 2020). This strengthens the idea that IWCE at VHS needs to be carried out in accordance with the characteristics of prospective employers of VHS graduates.

Types of industrial work culture in the automotive industries

There are several major industries in the automotive field and each industry has a varied work culture (Somerville, 2005). Work culture is deliberately researched and created (Kunda, 2006), as a strategy for an industry to regulate its employees in working to achieve company goals (Somerville, 2005). However, there are IWC from Japan that are popular and widely used by the automotive industry, namely *Kaizen* and *5S*.

Kaizen comes from the words *kai* (change) and *zen* (good) or change for the better (Palmer, 2001). Kaizen is an improvement effort that involves everyone in an industry. Successful implementation of Kaizen can result in a healthy atmosphere in which everyone in the organisation is aware of the main goals, objectives and measures of success. Kaizen is considered more than just a process of continuous improvement because it represents the effort made every day at work (Malik & Tian, 2006). The steps in Kaizen comprise (1) determining the area to be upgraded; (2) analysing and determining the main problems; (3) identifying remedial steps; (4) implementing remedial measures; (5) measuring, analysing and comparing results; and 6) standardising the system (Gupta & Jain, 2014).

5S is an acronym for five Japanese words that stand for *seiri* (separate), *seiton* (organise), *seiso* (clean), *seiketsu* (standardise), *shitsuke* (discipline) (Kato & Smalley, 2010). The 5S is the first step towards continuous improvement. Implementation of 5S ensures continuous improvement within the enterprise and results in better environmental and safety standards (Ho, 1999). The Kaizen and 5S concepts are general concepts that can be applied in various fields but must be customised according to the field of application.

Occupational health and safety (OHS) is the main IWC applied by every industry in the automotive sector. In Indonesia, OHS is regulated in Law No. 1 of 1970 concerning occupational safety, the implication is that every industry must implement it to be able to operate. OHS components that need to be considered in the industry include (1) safety knowledge in the field of engineering; (2) fire precautions; (3) safe use of a machine; (4) electrical handling; (5) rules for inspections of power plants and equipment; (6) safety at a construction site; and (7) managing chemicals safely (Ridley & Channing, 2008).

The IWC that has been described can be used as inspiration and a reference for automotive VHS to provide IWCE to students. Assistance from industries that are school partners is strongly encouraged, to help choose the appropriate IWC and determine strategies for integrating it into learning.

Method

This study is a qualitative phenomenological research design with a focus on the phenomenon analysed, namely IWCE in automotive VHS. The information is obtained from VHS teachers according to their knowledge and experience during the implementation of learning at schools.

Participants

Participants were five teachers of automotive VHS from public and private schools with 'A' accreditation in the Special Region of Yogyakarta and Central Java, Indonesia. We sought an overview of the implementation of IWCE in both public and private VHS, considering that public and private have differences in management systems and resources owned. Automotive VHS has several competencies of expertise, this study focused on 3 competencies required by large numbers of new workers, namely light vehicle engineering, motorcycle business engineering, and vehicle body engineering. Participants were selected purposively with consideration of teaching experience, industrial experience, and willingness to participate in the study. So the participants have been able to share their experiences in applying IWC to learning and knowing the conditions that occur in schools. Participants are identified by pseudonyms to ensure anonymity and accord with research ethics. Demographic data is presented in the Appendix.

Data collection techniques

Data were collected using semi-structured interviews with each participant, using pre-prepared guidelines (see Appendix). Interviews were held in April 2022, when the Covid-19 pandemic was still placing restrictions on activities in schools. Therefore, interviews were conducted using *Zoom* software because it was more flexible and could enable a face-to-face near-equivalent. Scheduling of the interviews was at participant's choice, so that they could provide information comprehensively, relax, and in accordance with the conditions that occur in the field, without any pressue.

Interviews were recorded through a *Zoom* capability, with the consent of the participants. Participants also gave approval for the interview results to be used as research data and published. Transcripts of the interview were done verbatim, and then each participant verified the story or answer that had been given by reading a copy of their transcript.

Data analysis techniques

Data analysis was performed after each participant had signed a permission for their interview transcript to be used. Data were analysed following Creswell and Poth (2019): (1) Managing and organising data; (2) Reading and creating memos of emerging ideas; (3) Explaining and classifying code into themes; (4) Developing and assessing data interpretation; and (5) Presenting and visualising data. Data analysis was assisted by the *Atlas TI* software to help determine themes, relationships between themes, and the research findings.

Transcripts were done manually to get accurate results, although this process was time-consuming because interview durations were relatively long, between 45 minutes and 1.5 hours. The format of the interview transcripts allowed easy read and analysing with *Atlas TI* software.

Interview transcripts were read repeatedly to understand the content and record the ideas that arose, either in the form of important notes or code names that can be used for data analysis. The codes that have already been recorded in the previous process were used in data analysis through *Atlas ti* software. The next step is to classify the emerging codes into themes.

The research themes that emerged in the data analysis process were interpreted to describe the implementation of IWCE in VHS and its obstacles. Interpretation in qualitative research seeks to abstract emerging codes and themes to acquire a greater meaning from the data (Creswell & Poth, 2019). This shows that in the process of data interpretation, the mastery of problems by researchers plays an important role in producing accurate and comprehensive data interpretation. The last process is to present and visualise data in the form of an article for publication. The accuracy of the interpretation was checked by sending draft articles to participants to ensure that the interpretation carried out was in accordance with the information provided by the participants. Because the interviews were conducted in Indonesian, translation into English was carried out to provide the illustrative quotations in this article.

Results

Quality learning that is able to represent real work is one of the determining factors for VHS being able to produce graduates who are ready to work. The results of interviews with the five VHS teachers stated that IWCE really needs to be carried out at school. There are two important goals put forward by teachers: (1) accelerating the adaptation of graduates into industry; and (2) supporting success in entrepreneurship. This shows that IWCE is very important to teach because the industry today wants a competent workforce that easily adapts to the dynamics of work in the industrial sector (Kvachev & Yudina, 2017; Tentama & Riskiyana, 2020).

Given the importance of IWCE, it needs serious attention and handling to optimise it. Responding to that need, our study of the implementation of work culture education at automotive VHS has identified three themes: teachers' central role, strategies implemented, and obstacles to improving.

Teachers have a central role in industrial work culture education

The implementation of IWCE at VHS still varies. Based on the results of interviews with participants, the teacher plays a central role in teaching it to students (Figure 1). This is because there is no standard form or operational guidelines for IWCE at VHS. So far, teachers have received information related to IWC that needs to be applied in VHS, one of which is directly from industry.

> ... we get the information from the industry, from the Internet, and from some experiences we have had when we carry out comparative studies or carry out observations in the industry. It's about like that, sir, if the guidelines in particular we don't have yet. (Andi)

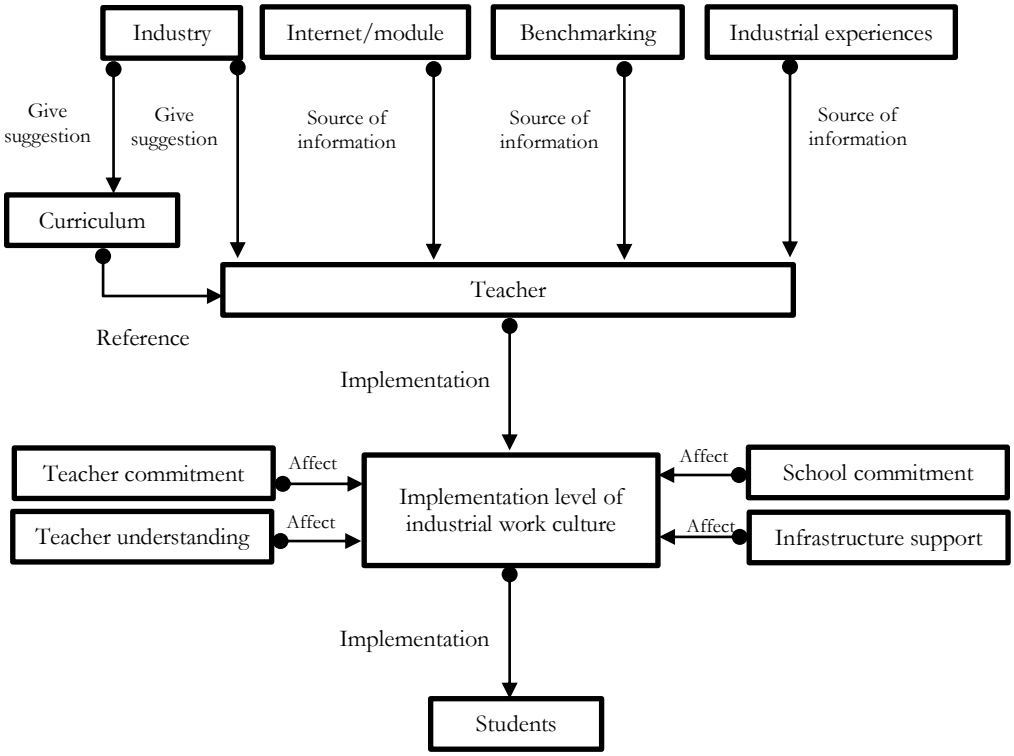

Figure 1: The pattern of industrial work culture education in vocational high school

Participants come from schools with 'A' accreditation, so the VHS already have an MoU (memorandum of understnding) or cooperation agreement with the automotive industry. Through this collaboration, industries contribute to providing information related to the curriculum. Important information is given to schools, such as work culture and competencies needed in the industry. This curriculum will be a reference for teachers in their teaching. In addition, industry also provides direct suggestions to teachers when visiting schools.

Teachers also gain knowledge related to IWC from the Internet or modules through independent efforts made by teachers to improve the quality of learning in the subjects they are taught, as stated by Arif:

> Well, some teachers who are actively willing to learn, learn it self-taught from modules, *YouTube*, and benchmarking to other schools. (Arif)

However, this really depends on the motivation of the teachers to develop their own knowledge and competence. Another source that provides teachers with knowledge related to IWC is benchmarking activities to other schools that have better quality. In addition, the teacher's industrial experience also affects the knowledge and type of IWC applied by teachers in learning activities. Teachers gain industrial experience through teacher industrial internship programs, industry-organised training, and industry visits programs.

To date, the level of implementation of IWCE in VHS is still dependent on the commitment of teachers and their understanding of IWC. Arif said that 'we are indeed, as stated earlier, only limited to the understandings that we know'. The statement shows that the level of IWC implementation depends on the understanding of teachers, while the importance of teacher commitment was stated by Ahmad, '... but back again to the commitment of their respective teachers again'. Based on participant information, IWCE has not become a simultaneous activity in VHS. Therefore, its implementation has not been standardised and still depends on the teacher's awareness to carry it out properly.

This implementation depends on the commitment of the school to enforcing the rules that have been made. However, the specific type of IWC still depends on each teacher. Arif said,

> Schools have so far not consistently enforced the rules that have been made, and the rules made have not led to IWCE. This causes the implementation of IWCE to be less than optimal. (Arif)

Iwan said, 'so far the rules made in schools are still limited to discipline and neatness, this happens in almost all VHS'. This information shows that to implement the IWC in VHS, schools must have a supportive vision and regulations and a commitment to implement them consistently.

The implementation of IWC is strongly influenced by the condition of practical learning facilities and infrastructure in schools. The environment in the school needs to be designed so that it can represent a workplace in industry, especially the practical learning facilities in it. Anton stated,

> In this vocational school, practical tools are complete, but those that support IWC, such as personal safety equipment and safety posters to support OHS culture, are not complete. Painting the practical learning environment has also not been carried out as in the industry. (Anton)

In the school where Arif teaches, they are still experiencing the same difficulties. Arif said, 'we still have difficulty equipping personal protective equipment (PPE), so we have not been able to carry out an optimal IWCE'. Based on interviews, all participants stated that they have not been able to provide OHS support tools and design the workshop as a practical learning place with painting and signs like in industry. This shows that the facilities and infrastructure in the school determine the level of IWCE implementation at VHS.

Strategies implemented in industrial work culture education

Based on the results of the study, there are two IWCs that have been implemented in automotive VHS although not all VHS have implemented them. IWC that have been implemented even though their implementation is not optimal include 5S and OHS culture. The IWC that is commonly implemented in VHS is the OHS culture, for the 5S culture, there are still many VHS that have not implemented it and are not familiar with this culture.

VHS's efforts to carry out IWCE still vary due to the absence of specific guidelines for automotive VHS. Although many strategies have been implemented, the implementation has not been optimal. The summary of strategy implemented by the school can be seen in Table 1.

Table 1: Industrial work culture education strategy at vocational high schools

No	IWCE Strategy	Implementation
1	Integration into theoretical learning	• Occupational health and safety theory • 5S theory
2	Internalisation in practical learning	• Gymnastics before practical learning begins • Briefing before practical learning • Using personal protective equipment in practical learning • Integrating work culture values into jobsheets • Implement occupational health and safety during practical learning • Teacher supervision during practical learning
3	Conditioning the school climate	• Socialisation of IWC • Establish an order enforcement team • Paint the workshop with signs and lines as in industry (examples: walking track for pedestrians and working area lines)
4	Guest teacher from industry (industrial practitioner)	• Industry practitioners teach students directly in schools
5	Industrial internship program for students	• Students take part in an internship program in industry

Types of IWC that are widely applied in VHS include OHS and 5S cultures. The theoretical substance of these two types of IWC is taught through theoretical learning.

First, integrate in theoretical learning. IWCE so far does not stand alone as a separate subject but is integrated with vocational subjects.

> Oh yes, we have applied this in theoretical and practical learning, which is related to 5S culture. The activities start with observing what is done according to 5S or not, then improvisation that can be done, this is part of the student's task for work culture. Incidentally, in vocational subjects at grade X, there are learning outcomes about work culture. (Arif)

Second, carry out internalisation through practical learning. One activity for internalisation of the values of IWC is joint gymnastics for teachers and students, carried out at one of the VHS before teaching commences. This aims to ensure that teachers and students have a healthy body and are ready to carry out learning activities at school.

> Every morning, we do a morning briefing and gymnastics. Usually starting with gymnastics first, in the morning we enter at 07.00, at 6.45, the students have started to gather and then open with gymnastics together, pray first, and then do gymnastics together. (Andi)

Routine activities carried out to internalise the IWC in practical learning include briefings before practice. In briefings, usually the teacher checks the readiness of students, provides directions related to practical materials, and OHS that must be obeyed by students.

> ... at the beginning of the practice we did briefing, so when there was a briefing together with all the students who were in the workshop it was all conveyed what to do when they were in the workshop environment. One of them is that industrial culture is like work safety... (Ahmad)

The use of PPE is one of the characteristics of an IWC that cannot be abandoned, with PPE the safety of students can be maintained. Even in real-world conditions, the use of PPE still cannot be fulfilled as a whole by VHS due to existing limitations. This is as stated by Arif,

> But because of the constraints on costs, such as for example, if the students don't have safety shoes, they may not be able to do everything as expected. (Arif)

Work culture values such as OHS are included in a jobsheet which guides students' practice. The IWC that has been applied in practical learning is centered on skills, OHS, and 5S culture, where the level of implementation depends on the teacher's knowledge, the teacher's commitment to carry it out, and the condition of the supporting infrastructure.

> Furthermore, when practical learning, students must be obedient in following occupational safety and health procedures, they are required to wear wearpack, safety shoes, and other equipment. Students must be responsible when they have finished the practice for organising and cleaning the workshop area. For students, coaching is directed at these things.. (Iwan)

Supervision by teachers is essential to ensuring the IWC is implemented by students. If supervision is lacking students may tend to ignore OHS and competency targets that must be achieved by each individual. Andi said,

> ... for a special team for such oversight, indeed, we do not have one, and we have indeed not compiled it. The supervision is divided among each teacher, so there is no special team, sir. (Andi)

Third, create a conducive school climate. School climate conditions greatly affect the internalisation of IWC, as favourable environmental conditions can encourage both

teachers and students to conform with IWC. The existence of rules that support the implementation of IWC and their enforcement play an important role in implementing IWC in schools. This is because IWCE requires simultaneous efforts to run optimally. Socialisation of IWC to all school residents is very important, so far socialisation has been carried out using posters and pictures pasted on several parts of the school. Iwan said,

> Just now for the rules already. For then, information such as 5S has been made into a banner and placed in strategic places, such as workshops, so that students can read or understand the work culture there. (Iwan)

In some schools, an order enforcement team has been formed that is tasked with enforcing discipline, student neatness, and compliance with the school's rules. This is one of the characteristics of IWC, as an illustration of violations committed by employees in a company that will have obvious consequences and can have an impact on salary cuts or careers in the future. Members of the order enforcement team usually are the vice principal of the student affairs department, a guidance counselor, and teacher representatives from each department in the school. Arif said,

> ... in the school, an order team has been formed, it has the task of disciplining the time of entry, rest, going home, hairstyles, and so on. (Arif)

Bringing industrial habits to schools is one of the strategies carried out by VHS to create a climate of IWC, such as creating green lines as pathways for pedestrians and work area lines. This is usually applied to practical workshop areas or certain areas in schools. Every member of the school must abide by the lines that have been made in accordance with his designation. Ahmad said,

> There are tracks or green lines for pedestrians. Every morning, we have been instructed to walk within the already-existing green lines. (Ahmad)

Fourth, bring in a guest teacher from industry. Several schools have tried to bring in guest teachers from industry to provide an overview of the IWC. This activity is carried out usually in the framework of training from industry or when providing debriefing to students before carrying out industrial internships. Andi said,

> ... in terms of industrial internships, when students are about to leave for internships, some industry partners teach industrial culture. (Andi)

Based on teachers information, students' responses to material related to IWC will differ between material delivered by teachers and industry practitioners. Students are more motivated to understand and pay attention if that information comes directly from industry practitioners.

Fifth, carry out industrial internships for students. The strategy carried out by the school to provide real IWCE is through industrial internships, Ahmad said,

> ... before entering an industrial internship, the student who was in the industrial class had to be quarantined again, there was industrial training.... (Ahmad)

This activity requires students to be directly involved in carrying out work in the industry, feel the climate and demands of direct work in the industry. It is hoped that students can internalise more deeply and learn competencies that have not been acquired in school.

Obstacles to improving industrial work culture education

Implementation of IWCE at VHS is currently still experiencing many obstacles from various aspects which makes the implementation less than optimal. The obstacles that were identified in the interviews can be grouped into several perspectives. First, from schools, as schools play an important role in the implementation of good IWCE. Schools are obliged to provide rules and support and enforce them. The obstacle experienced by schools is that the school rules enforcement team may not have worked effectively. In addition, socialisation needs to be carried out to all teachers, both non-vocational (teaching general subjects) and vocational (teaching engineering subjects), so that there is an understanding among all teachers and a common vision in enforcing IWC in schools, and that it is not a responsibility solely for vocational teachers. It needs to be promoted by a comprehensive effort from the whole school.

> ... so the obstacle is the commitment of non-vocational teachers in VHS. When the students are already in the workshop, the order is already pretty good, but when they come out of vocational subjects, it will usually be a little less able to be maintained as we have hoped ... (Andi)

Second, there is the perspective of teachers, who play a central role in the implementation of IWC in schools. Obstacles from the teacher aspect are consistency and commitment in implementing IWC in learning from both vocational and non-vocational teachers. Teachers' understanding of IWC is highly dependent on the experience of the teacher in industry. However, not all VHS teachers have industry experience either through internship programs or training in the industry. Awareness of teachers' need to develop themselves through training programs from industry or internship programs is still low, so it is necessary to have special programs from the government to trigger teachers' need to develop themselves. This problem co be minimised by increasing the effectiveness of the dissemination of training results. The problem that occurs is that not all teachers who have finished carrying out training or industrial internships disseminate the results of their training to other teachers intensively and programmatically, Iwan said '... but for automotive majors, other teachers are only asked to copy the training material, there is no dissemination'. Schools need to play an important role in facilitating and encouraging other teachers to participate in the dissemination of teacher training results, so that the impact is felt not only by the teacher concerned, but can have a wider impact on other teachers and students.

Third, regulatory aspects are still incomplete and not fully operational. Regulations for the implementation of IWCE in the curriculum need to be made more operational so that

teachers do not experience confusion in implementing them. Operational guidance according to the characteristics of the department is needed to equalise teachers' perceptions of IWC that needs to be implemented in each subject.

Fourth, the infrastructure aspect continues to experience problems. Supporting the realisation of an optimal IWC requires adequate supporting facilities and infrastructure. Under current conditions, infrastructure facilities are still lagging behind the industry, especially in the fulfillment of PPE, practical facilities, and OHS supporting facilities.

Fifth, considering the industry view, as the school's partner in producing competent graduates, it is necessary to help VHS improve learning facilities and infrastructure to strengthen the competence and IWC of students. So far, the industries have provided more information related to competence, OHS, and IWC that must be applied by schools that have established a cooperation agreement. In practice, realising this requires supporting facilities, not all of which can be fulfilled by schools independently. This is in accordance with the statement from Iwan,

> The condition is that the school must follow the prescribed workshop layout; the tools we need must be met by ourselves, and the industry does not help. (Iwan)

Table 2: Obstacles to industrial work culture education

No	Aspect of IWCE obstacle	Descriptions
1	School management aspects	• The school rules enforcement team is not optimal • Socialisation to the teachers
2	Teacher aspects	• Teacher commitment • IWC teacher understanding • Teacher training result dissemination culture • Teacher industrial experiences
3	Regulatory aspects	• Rules supporting the IWCE • Operational guide to IWC
4	Infrastructure aspects	• Practical learning infrastructure • Infrastructure to support occupational health and safety
5	Industry aspects	• Assistance with learning infrastructure
6	Cost aspects	• Providing personal protective equipment • 5S execution costs

Sixth, the problem behind other problems is related to limited funding. VHS is one type of education that incurss high operational costs. The development of technology and the dynamics of the industry cause VHS to face high costs to attain conditions that enable industry needs to be met. Specific limitations related to IWCE include providing PPE and resources for the implementation of 5S. Maintenance is still an obstacle because high costs may be incurred in the maintenance of training facilities.

> We had the idea to really create an industrial work culture that is 5S, especially Kaizen, which is applied in schools in a structured manner. However, because it is not provided for in at the school budget plan, it cannot run. (Arif)

According to information from Arif, this problem can be resolved with the school's commitment and careful financial planning, besides requesting assistance from the authorities or industry.

Discussion

VHS efforts to produce competent graduates are not enough to provide vocational skills (Billett, 2002). Adaptability of students in the working world needs to be strengthened by also introducing topics related to IWC in earlier stages of students' progression through their school years. IWC cannot be trained instantly but needs habituation that takes a long time (Ismara et al., 2020). So IWC needs to be taught to students from the very beginning of entering as VHS students.

Based on our findings, the IWC that have been implemented to date in several automotive VHS are the OHS and 5S cultures. This accords with views from experts concerning the the OHS and 5S cultures as a minimum for work culture applied in VHS (Ismara et al., 2020), but its implementation needs to be improved to get the desired results. Schools need to identify and implement other work cultures that are relevant to the needs of the working world, such as workplace civility and the avoidance of bullying and harassment.

Our study found that VHS teachers have played a central role work culture education. The quality of learning depends on the quality of the teachers (Graham et al., 2020). Teachers need to have sufficient knowledge and experience to teach and create a working climate in schools, as this greatly affects the success of learning (Wang & Degol, 2016). The commitment of teachers in applying IWCE in the subjects they teach varies; it can arise from awareness within a teacher, and can also arise from external factors (Gibson, 2015), such as the existence of consistent rules and enforcement from the school, and the support of a school environment that consistently implements the IWC. This condition has implications for the importance of the government's attention to continually improving the quality of existing teachers with training programs, internships, and competency certification. In addition, every teacher must have the motivation to improve his or her competence (Bakar, 2018).

Supportive infrastructure is very important in the application of IWC in the learning process. In achieving this, it needs to be supported by adequate infrastructure and facilities, especially for practical learning, although it will be very difficult for VHS to meet an infrastructure that is fully in accordance with industry (Pambayun et al., 2020). Therefore, VHS must be able to optimise use of existing facilities and infrastructure as much as possible, to familiarise students with working in accord with the culture in the industry. The rest that cannot be accommodated in schools can be obtained when students carry out internships in industry (Binder et al., 2015; Gamboa et al., 2021). The implication is that schools must have a clear internship curriculum related to industrial internships (Masole & van Dyk, 2016) so that the initial competence of students can support the implementation of internships, and when engaged in internships students can get experience that is able to complement their initial competencies. Internships are the

best way to strengthen the student's IWC and competencies because students directly carry out the work and feel the industrial work climate (Pan et al., 2018).

Improvement of VHS implementations of IWCE require government to continue building its role through rules and guidelines related to standards for application in schools. Through regulations from the government, all VHS will be more concerned and strive to meet the standards that have been set (James, 2010). The implication is that IWCE in VHS will increase. The identified strategy must be comprehensive to attain a good IWCE, but it needs to be balanced with the quality of its implementation (Gibson, 2015), and awareness that all parties - schools, government and industry - are needed to contribute towards better education in VHS.

VHS is still facing obstacles from various factors in implementing IWCE. If IWCE has not become a synchronous movement, it will be difficult to realise optimal implementation because true culture is something that has become an agreement and is implemented consistently by a group (Gibson, 2015). Schools must be able to provide rules that support the implementation of an IWC that covers all school members, facilitate its implementation, and enforce it. Schools must be able to actively cooperate with the industry and implement it because the industry is very dynamic (Zakharova et al., 2020). The potential for cooperation that can be built needs to be identified and realised, considering the limitations possessed by VHS, which must be overcome by collaboration from all stakeholders.

The active role of the VHS must be balanced by the industry, which must be willing to open up and contribute more optimally to help create VHS graduates who accord with the needs of the industry. So far, there is still a considerable gap between education and industry (Flynn et al., 2016). Contributions can be optimised from industry, especially to realise IWCE, namely providing information related to curriculum and infrastructure, providing internship opportunities for teachers and students, and assisting schools in completing the infrastructure needed to achieve high standard learning. Contributions from industry will also provide benefits to the industry itself because, with good learning, it will produce competent graduates so that it will provide prospective workers who are ready to work. Minimising competency gaps can save training costs for new workers (Tentama & Riskiyana, 2020). However, so far, the contribution of the industry is still not optimal, so the roles of the government and the activeness of schools are very necessary.

Research limitations and subsequent research recommendations

This research took participants from schools with 'A' accreditation, so the problems faced in other schools with other or lower accreditations will be different, more complex, and deserving futher researchb attention. The results of our study need to be complemented with quantitative research that can draw upon larger samples, so that the components or important factors of the findings can be more precisely identified.

Conclusions

IWCE is very important to be taught to beginning students while studying at VHS. This will be beneficial for students after graduation, both when working and in entrepreneurship. Graduates can more easily adapt to work in the industry as well as to establishing a business according to their field of expertise because they can implement an IWC to produce a productive, safe, and quality business. Teachers have a central role in the educational pattern of IWC because it is directly related to students in the educational process, so teachers must have sufficient understanding and industrial experience as well as a commitment to carry out IWCE. The strategies that have been identified from this study need to be strengthened in their implementation because every school and teacher still has differences in perception. Therefore, guidelines from IWCE are needed to equalise perceptions and provide standards for the implementation of IWCE in VHS. The obstacles and challenges that occur in IWCE need to be overcome and anticipated by collaboration between three stakeholders, namely VHS, government, and industry.

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Appendix A: Participant demographics (teachers)

No	Participants (pseudonyms)	Gender	Age	Teaching experience	Expertise competencies	VHS type	VHS locations
1	Arif	Male	29	5 years	Light vehicle engineering	Private	Special Region of Yogyakarta, Indonesia
2	Andi	Male	34	11 years	Vehicle body engineering	Public	Central Java, Indonesia
3	Ahmad	Male	31	6 years	Light vehicle engineering	Public	Special Region of Yogyakarta, Indonesia
4	Iwan	Male	30	7 years	Light vehicle engineering	Public	Special Region of Yogyakarta, Indonesia
5	Anton	Male	27	5 years	Motorcycle business engineering	Private	Special Region of Yogyakarta, Indonesia

Appendix B: Semi-structured interview questions

1. Do you think industrial work culture needs to be taught in vocational high schools? Why?
2. What aspects of industrial work culture need to be applied in vocational high schools?
3. How far has industrial work culture been applied in vocational high schools? In what areas? On what subjects?
4. What are the efforts of the school to ensure the industrial work culture is well implemented?

5. Does the school have industry partners? What is the industry's contribution to creating a good industrial work culture in vocational high schools?
6. Are there any guidelines for implementing an industrial work culture in learning at vocational high schools?
7. What are the strategies teachers use to implement industrial work culture in their respective subjects?
8. Do you think each teacher consistently implements an industrial work culture in their respective schools?
9. What are some efforts by schools to internalise the industrial work culture?
10. How do schools support the implementation of the industrial work culture? (such as vision, mission, goals and rules, climate conditioning of industrial work culture)
11. How do teachers understand the industrial work culture?
12. How is the support related to school infrastructure in creating an industrial work culture?

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