Teaching Management in the Industrial Revolution 4.0: The New Teacher's Worldview

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The objective of this article is to analyse the perspective of teachers' worldview about teaching management in the Industrial Revolution 4.0 era. The research questions include 1) how do teachers carry out learning management in the Industrial Revolution 4.0 era? 2) how is the paradigm shift in learning management the result of the Industrial Revolution 4.0? This research was conducted within a qualitative framework with a case study design. The research data was collected from high school teachers within two provinces in Indonesia. According to the research results : 1) In the process of planning learning, teachers have integrated technology in the media and learning resources. The success of learning is determined by the extent to which the teacher can improvise technology in the process of delivering material and thematic discussion; 2) The Industrial revolution 4.0 era has created a paradigm shift in learning management, from teacher centred towards collaboration between student and teacher. This shift allow the learning atmosphere to become more active and dynamic. Through this approach, teachers believe that students are able to learn tolerance, democracy, and social solidarity.

Key words: *Worldview, teacher, teaching management.*

Introduction

Indonesia is currently undergoing a major change in education, in the same way as almost all Southeast Asian countries. The main contributing factor is the wave from the Industrial Revolution 4.0 era (Benešová & Tupa, 2017) which reflects a major change in the development and utilisation of technology in life (Drath & Horch, 2014). This change affects the economic, educational, social, legal, cultural, and governance aspects of society(Lasi, Fettke, Kemper, Feld, & Hoffmann, 2014). One of the main characteristics of the change is the use of the Internet in every human activity. This is demonstrated by human dependence on smartphones as almost everyone needs them for daily activities. The Industrial Revolution not only changed lifestyles, but also life orientation. In Southeast Asian countries, such as Indonesia, Malaysia, Thailand and Singapore, the impact of the Industrial Revolution is quite visible in a number of areas, one of which is in the field of education. Learning has become a very a very dynamic activity. However, this does not mean that the community has abandoned the old norms and ethics. Rather, that a new pattern has emerged in terms of social interaction and ethos in millennial society.

The Industrial Revolution 4.0 not only brings improvements, but also challenges that need to be addressed by all members of the community (Sommer, 2015). In Indonesia, there are many conveniences offered as a result of the industrial revolution, such as in payment transactions , banking, general administration, and entertainment. Unfortunately, all these conveniences have sacrificed the existence of groups of workers, as humans are getting replaced by machines for completing various tasks works. The impact of this is that the community is concerned because the sophistication that they are facing becomes a competitor against themselves (Hermann, Pentek, & Otto, 2016). In addition, education has a central role to prepare the younger generation to work in society, especially with mastery of competencies in accordance with the Industrial Revolution 4.0. Regarding competence in the 21st Century, , people need to have abilities of critical thinking and problem solving, creativity, collaboration, and communication (Ananiadou & Claro, 2009; Trilling & Fadel, 2009). These four abilities represent the ability standards that need to be possessed by people in the Industrial Revolution 4.0 era.

Something that cannot be excluded in the development of human resources is the educational process. Moreover, the role of teachers in education is very important in providing knowledge and learning experiences to students (Adler, 2008). In this context, teachers not only function as providers of material, but also as partners for students during the learning process. This is fundamental, considering that education in the old era has enabled the teacher to be a single actor within the classroom (Becker, Hornung, & Woessmann, 2011). This was quite often as a result of providing too much learning material through lectures, as a result students finally became bored uninterested in exploring the material being taught. This, of

course, creates a stigma around the lesson . Therefore, in this phase the impact of the Industrial Revolution 4.0 is quite important as the integration of technology in education has changed the climate of teaching and learning, which, in addition to collaboration between technology and education in the 21st Century, has transformed the educational process into a democratic and shared process that has an important function in preparing the younger generations to face their challenges (Trilling & Fadel, 09). The challenges in the Industrial Revolution 4.0 era are of social orgin; to respect differences, maintain diversity, and become more aware regarding social media.

Puncreobutr examines the symptoms of Revolution 4.0 in education. His published writings contain learning strategies integrated with technology to build advanced and competitive societies. The paper has observed critically that the symptoms of Industrial Revolution 4.0 are not always positive. Thus, education must be ready as a tool for facing these challenges (Puncreobutr, 2016). "Learning to teach" by Arends and Castle has opened up our knowledge about the relationship between education and social change. Arends elaborates that people must remain dynamic when facing extreme challenges while Castle argues that Industrial Revolution 4.0 is an extreme change that can trap humans to become slaves to technology, but Arends view education as an antidote to the negative impacts of ongoing change where the teacher becomes an agent who has a vital role in maintaining clarity of knowledge and shaping students' mentality (Arends & Castle, 1991). Harris et al view education as a tool for change and teachers as actors for that change, but the Industrial Revolution 4.0 has succeeded in changing the role of teachers from actors to agents. Teachers, along with their knowledge and perspective of looking at social problems, have a challenging task in this era as good teachers are required to be able to use technology as evidence of their currency. The use of technology can be implemented in the learning medium . As such, teachers are pioneers who are masterminds in every performance. This is the most important idea mentioned in the work of Harris et al (Harris, Mishra, & Koehler, 2009).

This research focuses on teacher competence (Banks, 2006), teaching management (Cameron & Whetten, 1983), and the use of technology in learning (Sandholtz, 1997). The research also uncovers the objectives of learning management by reviewing the developed competencies of students. Therefore, the research questions focus on 1) how do teachers carry out learning management in the 4.0 Industrial Revolution era? 2) how does technology play a role in developing student competencies?

Methods
Research Design

This research is an educational project that aims to analyse the perspective of teachers' worldview about teaching management in the Industrial Revolution 4.0 era. This research

used a qualitative framework with a case study design. The case study framework used refers to Yin, consisting of 1) Looking at cases as contemporary phenomena; 2) Performed in actual living conditions; 3) Using various data sources (Yin, 2017). More specifically, a situation analysis case study was used in this research. The research case focuses on the changing perspective of teachers' worldview about teaching management. Educators initially saw teaching as a formal activity that is bound by rules and seem static, however now they consider it as a stage for expression that is not bound by formal rules. Yet, in this context they still pay attention to moral and ethical standards of teaching. The change mentioned is indicated to occur due to the trend of Industrial Revolution 4.0 (Lasi et al., 2014). The above aspects are the objects of analysis that are explored through informants, documents, and observations of teaching activities.

Research Participants

This research involved 150 high school teachers as participants who came from 2 provinces in Indonesia; Central Java and South Kalimantan. The 150 participants were divided into 3 categories, namely from schools with national accreditation A (Very Good), B (Good), and C (Fair). In addition,, they were also divided into 6 categories, namely teachers of social science and humanities, such as history, sociology, civic education, economics, geography and literature. This category was determined based on the agreement of the Research Team considering that the researchers wanted to complete a deep analysis about the perspective of teacher's worldview on teaching management. This specified category was predicted to potentially provide a unique data variant, which will be the main point of the findings and require further analysis .

Data Collection

In this research interviews, document analyses, and observations were used as data collecting techniques . The data obtained was then reduced and tested for validity using triangulation and member check. For data collection, the Ollerenshaw and Creswell model was used, and we must focus on the elements present within the case study through data collection. Those aspects are the most possible sources of data to be extracted. The researcher must pay attention to the details of each of these elements within a situation analysis (Ollerenshaw & Creswell, 2002).

This research attempts to analyse the perspective of teachers' worldview about teaching management in the Industrial Revolution 4.0 era. A worldview is a fundamental cognitive orientation of an individual or society that includes all the knowledge and perspectives of said individuals or society, including natural philosophy; fundamental, existential, and normative assumptions; or themes, values, emotions, and ethics (Cobern, 1996; Naugle, 2002). This

research has three areas of focus on teachers' view, namely, 1) fundamental, 2) existential, and 3) normative, concerning the management of learning in the Industrial Revolution 4.0 era. The results of data collection from predetermined techniques were then transcribed or processed to obtain the main points of the findings. From this process, the research produced 8 transcripts which in this case are shown through coding; Teacher Data 1 = TD1, Teacher Data 2 = TD2, etc.

Data Analysis

To obtain in-depth results, the researchers allowed the research to build to a snowball like effect . Therefore, the data analysis used in this research was based on an interactive model from Miles Huberman and Saldana which generally includes data collection, data presentation, drawing conclusions, verification, and data condensation (Miles, Huberman, & Saldana, 2014). This data analysis model is very compatible with the case studies under investigation. To obtain an in-depth situation analysis, dynamic data analysis is needed that allows researchers to complete the data shortage at any time. Through a Focus Group Discussion, when receiving a lot of input and criticism regarding the results of a temporary study, this data analysis model is extremely helpful to researchers to complete the data and conduct further analysis, which will be presented in the next section.

Results

The results below illustrate the perspective of teachers' worldview about teaching management in the Industrial Revolution 4.0 era. The most interesting finding that can be presented here concerns teachers' knowledge and competencies that must be developed through integrated learning technology. The teachers also respond to many cases of misuse of technology that endanger the psychological condition of children. The problems faced in learning management are also interesting findings to be presented.

Core Competence, Technology Integration, and Learning Planning

In the current digital age, teachers can see that technology integration is very important for learning, especially in social science and humanities subjects such as history, literature, social studies, and citizenship. TD2 notes: "Technology integration is the key to success in learning now that there is a lot of information that can be accessed quickly, including learning material. Students can easily learn formulas or other materials openly". Correspondingly, TD4 comments: "Technology is very important for learning as currently in all learning plans, teachers must incorporate aspects of technology, for example encouraging students to view videos on YouTube, asking students to access several journal articles on the internet, or

requiring minimum one book from google books as a source of learning, " It certainly becomes a great progress and added value for learning as in Indonesia, along with the buzzing ideas of 21st Century Education, technology has become a big determinant in learning. A different opinion is conveyed by TD2: "Technology is important, but it also needs to be noted that this technology comes with challenges. It is not uncommon for information contained on the internet to be in the ideal form. However, it is also similarly uncommon for getting information like garbage, such as snippets of invalid data. Our task as teachers is not only to encourage, but also to provide insight concerning the ethics of technology."

The use of technology then encourages teachers to conduct innovations for core competencies in learning. In the 21st Century, four competencies that consist of critical thinking, creativity, collaboration, and communication have been listed which must be mastered by students. TD2 argues: "21st Century competence is important, considering the coming challenge being [text missing] though as they not only challenges at the national level, but also at the global level that require independence and rational thinking of each individual. According to teachers' perspective, the core competencies need to include two components ; knowledge and morality. TD1 believes that : "Core competencies should contain knowledge aspect because this is to emphasize that schools are an important academic process for civilization. This academic process requires competition. Therefore, the teacher as a learning moderator needs to manage any existing potential in the classroom. This competency management will facilitate teachers in providing learning material". At the same time TD3 maintains : "In addition to knowledge, students also need to be equipped with moral and character education. Otherwise, as often occurs in many cases, many teenagers no longer have respect for older people. Therefore, the core competencies that students need to have must contain aspects of morality and ethics". The core competencies and technology have been included in the learning plan in which teachers have prepared everything, starting from objectives to the syntax of the method used in teaching. TD6 writes: "In planning learning, teachers must include technological aspects as in Indonesia it becomes an obligation. They need to be creative in improvising technology, for example by including social media content as it is one of the learning instruments for utilising information available on the Internet. However, it must be noted that teachers also need to foster student emotions to be intelligent in utilising the digital world. Therefore, important ethical and moral aspects are included as core competencies in learning".

Teachers' Digital Literacy

Teachers view the Industrial Revolution 4.0 as a momentum to quickly develop their own competencies . The ease of gathering information through the Internet and social media is the main reason. Teachers can monitor the condition of the development of world education through social media, such as Twitter, Facebook, Instagram, YouTube, and WhatsApp. There

are lots of social media available that can be used by teachers to develop their competencies. Moreover, teachers can also use websites, such as ruangguru.com, which is a popular site managed by professional teachers to provide information about education to both beginner teachers and the community in general. As TD2 argues: "I often use social media to increase my knowledge. I quite frequently ask my students to look for information on YouTube or ruangguru.com. It turns out it is very helpful for their learning. By the time of the test, students usually learn automatically through these media. I have tried, several times, to conduct discussions via Twitter and the students were quite enthusiastic". TD3 comments: "A very creative social media for me is YouTube as I can easily teach materials through video or film. There are also some content creators that make discussions about how to quickly learn Mathematics which greatly impacts on success in learning. The point is that teachers nowadays do not need bother thinking about ways to teach, because technological sophistication has greatly helped them regarding this matter."

Learning Innovation

Teachers have succeeded in performing innovations in learning, in terms of methods, models, media, and learning resources. They always maximize all existing potential to achieve learning objectives. Young teachers have the competence to produce all sorts of learning resources , for example info-graphics, booklets, short videos, and PowerPoints that contain interesting content. Conventional learning material such as lectures or note-taking methods have started to be abandoned as teachers tend to instruct students to learn creatively both in understanding and memorizing materials. TD4 states: "I often use info-graphics because for me teaching is an art. Therefore, I always create entertaining learning", whileTD5 explains: "I believe that creativity can be generated in every moment as I often innovate in teaching methods. I teach geography a lot using 3D stereoscopic media and it helps me to explain learning material, for example layers of soil".

Evaluation Technology

Evaluation of learning has been integrated with technology as teachers are greatly facilitated by the existence of several applications that can be used for evaluation, such as Plickers and ZipGrade. Both applications greatly enable the learning evaluation process and more importantly, both are paperless. Plicker helps teachers make formative assessments using codes, the only device needed is a tablet or smartphone. Plickers can be downloaded from the application store. It can also be used by teachers to provide multiple choice questions to students. On the other hand, ZipGrade is a grading app where there is no need to wait using a Scantron machine or scanner. Students can immediately receive assessment feedback and see test scores after they finish working on the questions. This application helps teachers to create and print assignments as the questions provided can be directly scanned via smart phones. TD8 states: "Evaluation of learning is very easy to prepare as everything is all based on

digital technology. The presence of a smart phone makes it easier for students to learn. I usually use Plickers because by using the application, the evaluation results can be directly seen, which strongly supports the assessment's objectivity . Therefore, the sophistication of the technology greatly reduces and eases the teaching evaluation process .

Teachers and Social Media

Social media has now become one of the instruments in teaching as teachers often use it to share information and conduct discussion. In addition, teachers in Indonesia also support a clean social media program, which is a movement against hoaxes that publishes information that is beneficial to the community. Some examples of social media used by teachers are illustrated in the below table:

Table 1: Social Media and Teachers' Age Range

Social Media	Age range of teacher users
Facebook	24-45 years old
Twitter	24-30 years old
YouTube	24-35 years old
WhatsApp	24-58 years old
Instagram	24-40 years old

The most popular social media among teachers are WhatsApp and YouTube, both of which are often used for discussion by both teachers and students. In the opinion of teachers, YouTube is one of the most useful media to make up for the lack of learning media as students are already familiar with social media. Therefore, it is very easy to instil an understanding in students about the media in use . Meanwhile, WhatsApp is used more for daily communication, even though it can also be used as a discussion forum. Other media such as Twitter, Facebook, and Instagram are not used as intensely , but they offer the benefits of sharing news or information about learning. In a subject called Citizenship , students are asked to research information about nationalism and patriotism from these social media. In literary subjects, students are asked to express themselves in a positive manner in existing social media. Therefore, suffice to say that social media has become an inseparable part of Indonesia's education and very helpful through social media content and features .

New Teaching Paradigm: Collaboration

The world of education in Indonesia changes rapidly and the change that is most easily observed today is the shift within the learning paradigm. Before the 2013 Curriculum was introduced, the teacher positioned him or herself as the source of student learning. Therefore, lecturing was the most common method of teaching . As TD7 says: "Today, since the

enactment of the 2013 curriculum, the lecturing method is seldom used, because it is part of the classical paradigm. Now, teachers can easily improvise and be creative in choosing learning methods and models. The Collaborative paradigm is more appropriate to describe the spirit of the times."

TD3 argues: "The collaborative approach aims to enable students to build their knowledge through dialogue; by sharing information between students and teachers so students can improve their mental abilities at a high efficiency. This model is used in every subject, especially those that provide the opportunity to develop information sharing between students and students with their teachers."

TD 1 explains: "Collaborative learning is described as a teaching model that demands students' collaboration in small groups to achieve common goals. The thing that need to be emphasized in collaborative learning activity is that students work together to solve the same problem, and not individually to solve the separate parts of the problem. Thus, during collaboration, students work together to build a shared understanding and concept in order to solve each part of a problem or task. Meanwhile TD4 argues: "A collaborative approach is seen as a process of establishing and maintaining the same concept of a problem. The collaborative learning model is seen as efficient because members of the learning group are required to think interactively. Experts argue that interactive thinking is not just manipulating mental objects, but also involving interactions with others and the environment.

In a class that uses a collaborative model, the teacher shares authority with students in a variety of ways. For instances, the he or she encourages students to use their knowledge, respect their co-workers, and focus on high-level concept understanding. TD 6 argues: "The teacher's role in the collaborative learning model is that of a mediator. The teacher connects new information to students' existing experiences, helps students determine what to do if they experience difficulties, and helps them learn about how to learn," Furthermore, the teacher as mediator also adjusts the level of information delivered to students and encourages students to maximize their ability and be responsible for the next teaching and learning process. This collaborative approach has a socially positive impact as it makes it easier for teachers to communicate and manage classrooms, so that the potential barriers to learning management are minimised. The teacher also considers this approach to enable students to be more open in the classroom. Teachers oppose the static and formalistic communication model as according to them, the communication model is not in accordance with current trends.

Discussion

The Industrial Revolution 4.0 has had an impact on the world of education in Indonesia. It was marked by a shift from the classical paradigm to a new paradigm which is more

influenced by digital technology. In this era, teachers see a number of new competencies that need to be included as content in learning, especially 21st Century competencies. This research supports the opinion of Ananiadou et al, Puncreobutr, and Trilling and Fadel who maintain that the Industrial Revolution 4.0 has a positive effect on education. This is evidenced by the digitisation of education, where within the context of this research, it can be seen in the teaching process carried out by utilising social media and websites (Ananiadou & Claro, 2009; Puncreobutr, 2016; Trilling & Fadel, 2009). This research also supports Rosalina's opinion that teachers currently play a role in designing enjoyable learning resources, so the potential for boredom will be minimised. In addition, teachers believe that students are now highly competent users of technology , so it is very easy to teach them an understanding of the benefits of technology for education. Some cases show that teachers collaborate with students to create narratives against hoaxes on social media, a hallmark of 21st Century education; critical thinking and problem solving (Rosalina, 2012). This research also supports Locke's opinion that management education in the 21st Century needs to pay more attention to ethical aspects. Currently, the use of technology has a strengthening impact on cognitive aspects, but a weakening impact on affective aspects of society. Therefore, important ethical aspects become one of the objectives of learning as Locke suggests: science cannot grow civilization without the role of ethics in society (Locke, 2002). Awareness of the importance of ethics in education is shown by the opinion of teachers according to which as a civilized society, ethics cannot be ruled out despite formalism, as the classic paradigm being the main benchmark in education.

The paradigm shift in learning from classical to technology based is caused by teachers awareness of contemporary needs . Young Indonesian teachers are very creative in creating, producing, and utilising the potential around them to achieve learning goals. In addition, an understanding of current theories and approaches in education makes it easier for those young teachers to manage their teaching process. One of the most popular teaching approaches today is collaboration, which is teaching that promotes social processes between teachers and students to achieve learning goals. At the same time, the results of this research support the opinion of Bruffe and Dillenbourg according to whom the practice of collaboration in schools today greatly affects the personality development of students as teachers facilitate achievement of learning goals within the cognitive, affective and psychomotor aspects. Through the collaborative model, teachers have succeeded in developing positive attitudes in learning, such as tolerance, democracy, solidarity, and the courage to express aspirations. Furthermore, students become more active in learning, bearing in mind that this approach is very dynamic . Therefore, management of learning that focuses on collaboration is highly recommended in all schools worldwide (Bruffee, 1993; Dillenbourg, 1999). Within the context of collaboration, this research reinforces Gokhale's findings that collaboration is one of the reasons why students must always think critically because within this approach the teacher encourages them to think. Cognitive activities that are completed naturally will

habituate students in solving problems. Thus, the collaborative approach strongly supports 21st Century education (Gokhale, 2012). Lastly, in the digital era, the collaborative approach is very compatible with the current emphasis on the use of technology in learning .

Conclusion

Teachers have greater challenges in the Industrial Revolution 4.0 era. One of these challenges is integrating technology into learning. Teachers currently have a habit of utilising digital technology, so that within the process of learning management, they are more impressive and dynamic. Technological aspects can be observed in the learning plan as teachers now find it easier to express their creativity in learning. It is not uncommon for teachers to create their own media and learning resources for learning instruments for the sake of easy delivery of the material that has been prepared. In the current era, teachers also use social media for learning, an example of which is   subject of <u>Citizenship</u>. Teacher see that technological openness has now encouraged the growth of hoaxes, so students need to be educated to fight back by uploading positive content on social media. In addition to learning activities, the current evaluation also utilises technology. This supports the idea of paperless learning in education. The Industrial Revolution 4.0 era has shifted the classical paradigm in learning. Initially, teachers tended to be individualistic in their teaching style, now they have begun to use the collaborative approach as an alternative method in teaching. This approach, based on teacher's perspective, has developed the ideas of tolerance, democracy, and social solidarity within learning.

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