Strategies in Improving Teacher Quality in the Industrial Revolution 4.0: A Literature Review

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Abstract—**This writing aims to (1) describe the strategies that can be carried out by schools to improve the quality of teachers in the Industrial revolution 4.0; (2) describe the supporting and inhibiting factors in improving the quality of teachers in the Industrial revolution 4.0. This paper is based on a systematic literature review. This literature review uses database journal to search sources and uses content analysis to find relevant articles with this problem research. The review was carried out through the collection of several related articles from the JSTOR and IEEE databases. In the article selection process, the author examined and found 12 related articles in a five-year period, that is 2014-2019. The results of this literature review are (1) knowing the strategies that can be implemented by schools to improve the quality of teachers in the Industrial revolution 4.0; (2) knowing things that support and inhibit the improvement of teacher quality in the Industrial revolution 4.0.**

Keywords—*school strategy; teacher quality improvement; industrial revolution 4.0*

I. INTRODUCTION

Rapid and powerful changes in society give more complex tasks to education. Public trust in schools related to the function of instilling moral values in students following the objectives of education in line with the development of science and technology requires stakeholders to develop innovative school quality. Factors that influence the success of schools to improve quality include the quality of human resources. In other words, the implementation of education in schools is expected to be able to respond to the demands of today's life on the quality of teachers. Teacher is the figure of totality that is expected by the students to be a source of hope, knowledge, wisdom, and inspiration. Therefore, the teacher should have done the best thing for students by becoming a person who wants to continue learning under the times.

The effectiveness of teacher performance cannot be ignored because it is a key success factor in achieving educational goals. Teacher contributions and professionalism that are valued and trusted are important elements for teacher motivation in improving quality [1]. Future teachers will face more authoritative characters, not authority, that is, characters that not only require knowledge but also the fact of existence [2]. Teachers are required to have integrated skills between knowledge and life. In the era of the industrial revolution 4.0, teachers need to have a paradigm shift in the process of delivering knowledge because students prefer to follow learning that is assisted by modern telecommunications tools [3]. The teacher's role will be replaced by artificial intelligence if the method used is monotonous, and the material delivered is only from books. Students no longer need one-way knowledge, but interactive learning, counseling, and mentoring. The role of the teacher needed at this time is not just to convey the material, but also as a social and emotional manager of students to become a person who is ready to share and participate [4]. Thus, improving teacher quality is a strategic program because teacher quality has a chain effect on other education components while not all teachers can improve their ability to respond to dynamic issues related to education. Therefore, schools as the central place of the educational process must create situations where teachers can work collectively and develop the capacity to reflect and evaluate their progress [5]. Schools must strive for teachers to keep abreast of developments in science and technology, as well as the needs of society in the industrial revolution 4.0.

This literature review presents an overview of strategies to improve teacher quality in the industrial revolution 4.0. The aim is to provide insights related to actualization in preparing teachers who can respond to changes in the era of the industrial revolution 4.0. The literature review questions are as follows:

(RQ1) What should schools do to improve the quality of teachers in the industrial revolution 4.0?
(RQ2) What factors support and hinder the improvement of teacher quality in the era of the industrial revolution 4.0?

In this article, the researcher explains the method of literature review and the study chosen to answer two research questions based on the articles selected in this review. The researcher discusses empirical findings in this literature review discussion and provide suggestions for future research. In the final section, the researcher points out the limitations of this study.

II. METHODS

The methodology that will use in this literature review uses mapping reviews, namely, map out and categorize existing literature from which to commission further reviews and/or primary research by identifying gaps in research literature [6]. The researcher did the mapping by collecting data from the JSTOR and IEEE search engines, then mapping data relevant to this research. Keywords used in data search are strategic schools, teachers in industrial revolution 4.0, quality teacher improvement, and education innovation 4.0.

The article search found 1734 articles from JSTOR and IEEE. Researchers then began to limit the number of articles relevant to studies published between 2014 and 2019 from JSTOR and IEEE to 231 articles and used 79 "education" subjects following this study. The researcher reads the abstracts of the articles found and the full text of the abstract does not provide enough information for decision making. In the process, researchers included empirical studies that focused on improving teacher quality in the era of the industrial revolution 4.0. From the number of articles that fit the title of 12 articles, the following is in Table I.

TABLE I. OVERVIEW THE SELECTED STUDIES FOR THE REVIEW

No.	Study	Method	Sample	Country
1.	[1]	Qualitative	Teacher	Thailand
2.	[3]	Quantitative	Teacher	Malaysia
3.	[5]	Magazine	-	Kenya
4.	[7]	Literature Review	-	Malaysia
5.	[8]	Magazine	-	Malaysia
6.	[9]	Magazine	-	USA
7.	[10]	Literature Review	-	Malaysia
8.	[11]	Qualitative	Teacher	Australia
9.	[12]	Mix Method	Teacher	UK
10.	[13]	Critical Review	-	Netherland
11.	[14]	Literature Review	-	Cyprus
12.	[15]	Qualitative	Principal	Africa

An analysis data was conducted after the sources successfully collected. It is the content analysis. Content analysis is the study of documents and communication artifacts. This analysis data method was chosen because to investigation by describing various articles about improving the quality of teachers in the era of the industrial revolution 4.0 objectively and systematically.

III. RESULTS AND DISCUSSION

A. School Strategies to Improve Teacher Quality

From the relevant literature search results, the researchers concluded that there were two strategies that schools could undertake in improving the quality of teachers in the era of the industrial revolution 4.0, namely providing teachers access to collaborate, and providing information and communication technology services. Being a teacher in this very dynamic era does require a lot of learning to improve quality and hone skills that are already owned. Teachers in the digital age must learn mindsets, have digital literacy, continually learn new things, and must be able to take advantage of opportunities in industrial revolution 4.0 for better teaching. Industrial revolution 4.0 provides opportunities for innovative learning practices that can optimize teacher productivity and learning outcomes [7].

In the information age, schools must increase teacher productivity by increasing communication and collaboration between them. Schools that provide open workspace will have fewer obstacles in their interactions because being able to make everyone aware needs things to be learned from others and must work together regardless of experience, age, and area of expertise. This method helps teachers improve student skills in the 21st century, including collaboration, problem-solving, creativity, confidence, peer assistance, and leadership [8]. Teachers who work in environments that support professionalism become more effective in increasing student achievement [9]. Professional teachers must recognize and adapt to rapid development so that they can achieve the school quality expected following the vision.

Schools that become practical applications by teachers when confronted with classroom reality must be able to identify the quality of teachers to continue to be improved. Schools must provide teachers with access to resources (finance, time, halls, etc.) to ensure they can help students and solve problems encountered in their classrooms. Even though they have become teachers who motivate students, they also need extrinsic motivation from school and peers to be able to create effective classes [10]. Further studies find that quality improvement is most effective when giving teachers active intensive learning opportunities, focusing on discrete skills, aligned with curriculum and assessment, and applied in classroom contexts.

When teachers participate in effective teacher development programs, the quality of their teaching will improve which will ultimately be expected to influence student achievement [11]. It was also mentioned that novice teachers can improve their ability to achieve standards when they work in schools with more effective colleagues. Also, social networking among teachers, especially those who have high levels of expertise and deep substantive interactions, allows investments in improving teaching to be maintained over time. Schools can give advice or stop ineffective teachers and can also provide legal protection to qualified teachers [12].

Principals as leaders in schools have a strategic role in improving the quality of teachers. The process of leading and managing school change in the current era has placed the principal in charge of implementing the changes [13]. In this case, the principal is required to have a high awareness of distributing authority and responsibility proportionally. Stronger headmaster leadership, relationships between colleagues, and a positive school culture have higher student achievement growth among other schools. The principal must be able to criticize the changes that occur to realize an effective school program. The success of achieving school programs following the plan has a positive impact on the work climate which will certainly affect the quality of teachers.

The second strategy is for schools to provide information and communication technology (ICT) services. In the era of

the industrial revolution 4.0, teachers expect to use ICT in learning and administrative matters. Schools must periodically evaluate the ICT competencies of teachers and offer the training needed because of demands from students who have the perception that teachers are more proficient than they are. Teachers must collaborate with peers to improve their mastery of ICT so that they can meet the demands of students and externally concerning the information resources they need [14]. Schools can support teacher initiatives by creating a culture that allows teachers to try new practices because having ICT knowledge still requires confidence to implement [15].

The current use of technology in schools' results in teachers facing new challenges related to the design of integrating technology into learning. This issue provides clear considerations to facilitate teachers as technology designers who improve the quality of learning [16]. The integration of ICT in schools that continues to be fostered will take more benefits on the quality of teachers and to promote innovative learning practices [17]. In integrating ICT in schools, the convenience of teachers in using ICTs needs to be considered. Consistency in providing ICT services in the form of the availability of infrastructure and training must be the basis of schools. Having effective ICT integration in schools requires the presence of principals who are closer to the teacher's daily pedagogical activities [18]. This is given that the principal has the main role that is responsible for managing school change as a whole.

Education 4.0 desperately needs critical reflection for school change and improvement in teacher quality [19]. Also, school principals need to facilitate the improvement of teacher quality by closely monitoring the work of teachers, identifying the stages of existing teacher abilities, providing feedback, discussing the challenges faced by teachers, and exchanging ideas with teachers about possible ways of improvement [20]. The teacher must approach evaluation and advice as a means to improve the quality of teaching. Leaders in schools must allow teachers to increase their capacity by professionally giving feedback and evaluations, do not berate teachers when giving advice, track whether the teacher applies the suggestion or not. Teachers must respond and dedicate themselves to honest reflection and self-improvement based on the leader's evaluation.

B. Supporting and Inhibiting Factors in Improving Teacher Quality in the Industrial Revolution 4.0

In this section, researchers find supporting and inhibiting factors in improving the quality of teachers in the era of the industrial revolution 4.0 in articles found from search engines. The conclusions of the articles following this discussion are presented in Table II.

TABLE II. SUPPORTING AND INHIBITING FACTORS

Supporting	Inhibiting
Easy access to build social networks	The limited-time teachers have to develop themselves [21]
Principal's leadership	The teacher feels not ready to apply the results of the training
A supportive school environment	Local Government Support [22]

The availability of access is the main thing that supports improving the quality of teachers in the era of the industrial revolution 4.0. The development of ICT has changed the way of interaction between individuals. Inevitably the existence of the internet provides many conveniences for its users. ICT is very beneficial for teachers in improving their quality, namely by building collaboration between teachers within schools and between schools.

Good collaboration between teachers is needed to find new ideas to improve their abilities [23]. The working group can facilitate a discussion of the latest ideas and solutions to problems in learning by each teacher and is led by the principal. But this has a limiting factor that the average teacher has a lot of burdens so that they cannot set aside time for mutual discussion between teachers. This causes a tenuous relationship between teachers. With the internet, especially through social media or others, the work-family can run effectively anytime and anywhere so that teachers can quickly receive information. Utilizing ICT in new ways at school will produce innovative teachers who can influence school success and the quality of education broadly.

The realization of an effective school cannot be separated from the role of the principal. Principals need to respond to the needs of teachers in the era of the industrial revolution 4.0 with sufficient competence so that they can be effective leaders who can bring transformational schools. The principal must involve other people in the decision-making process and have more interaction than orders. Decisions made by the principal in improving the quality of teachers greatly affect the confidence of teachers to show their abilities.

Another factor is the existence of a supportive school environment in improving teacher quality. School environments that have teachers often collaborate, receive feedback, and acknowledge teacher efforts will improve teacher quality faster than schools that do not have such an environment. Specific elements of this school play an important role in facilitating teacher effectiveness. Teachers in schools with a professional environment have greater experience in improving the quality of teachers than schools with an environment that is allowed to flow alone.

Some things allow the experience to be an obstacle in improving teacher quality. Teachers who have had more experience do not have the confidence to share their knowledge with new teachers because they feel that the training they get is not right according to their needs. Often what is gained from training is only the theory that is less specific about the applicative explanation so that after the training the teacher feels not much change for the better. This is due to the lack of analysis of training needs. Therefore, schools must be able to identify the quality of teachers that must be improved and organize training according to needs.

The flexibility of school decisions often cannot answer the problem of training needs to improve teacher quality. Local governments are less supportive in terms of proposals for assistance in organizing inter-school teacher professional development which is part of collaboration between teachers between schools. They were present not to support implementation but to oversee school administration.

Therefore, the role of the principal to motivate teachers is very important in ensuring that teachers get access to improve quality especially in collaboration with other teachers. Effective collaboration is expected to be able to realize an effective education system as well.

IV. CONCLUSION

Based on the discussion above, there are two strategies that schools must take to improve the quality of teachers in the era of the industrial revolution 4.0, namely providing teachers access to collaborate, and providing information and communication technology services. Teachers are given to collaborate in the form of finance, time, opportunities, authority, and responsibility proportionately by the principal. The role of schools in improving the quality of teachers is very dependent on the role of the principal as the leader who becomes the main controller in managing the school.

The supporting factors in improving the quality of teachers are open access to build teacher social networks between schools that are not limited in space, leadership owned by the principal who is the main controller, and schools that have a professional environment are more effective in improving the quality of teachers than schools whose environment not support professionals. While the limiting factor is the limited time of teachers because of the many burdens in learning and administration, teachers feel not ready to apply the results of training because they feel that not enough knowledge is obtained, and the role of local governments which tend not to support but supervise school administration.

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