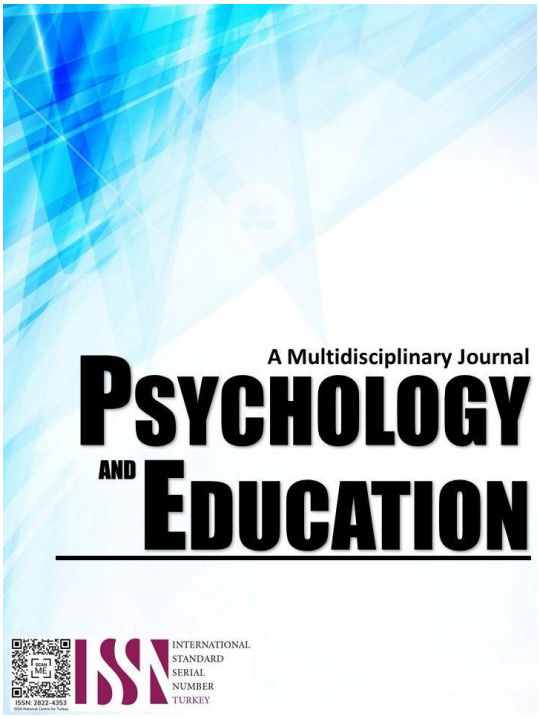
MANAGEMENT COMPETENCE OF SCHOOL HEADS IN THE AGE OF INDUSTRIAL REVOLUTION 4.0: A PHENOMENOLOGY



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Research Article

Management Competence of School Heads in the Age of Industrial Revolution 4.0: A Phenomenology

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Abstract

The purpose of this study is to provide findings that would assist educators in better understanding the role of school administrators and how working together to meet Industry 4.0 demands can enhance their practice. Additionally, the findings should help educational institutions stay informed of these latest advancements and create innovative, adaptable strategies to enhance teaching and learning. The Fourth Industrial Revolution has sparked an impressive wave of technological advancements, significantly reshaping the educational landscape. This qualitative phenomenological study delves into the experiences, coping strategies, and insights of ten public school heads from secondary schools in the Lupon West and Banay-Banay District Division of Davao Oriental. Purposive sampling was employed to select participants for this study, and the data generated from the in- depth interviews were analyzed using thematic analysis. Participants' experiences unveiled four major themes: utilizing the new technology, equipping teachers with modern technology, leading to learn the new system, and struggling with technology integration in Education. Amidst their challenges, three coping strategies emerged: embracing change positively, advocating digitalization in education, and fostering collaboration with stakeholders. In insights, three themes emerged, offering valuable lessons for school heads: promoting digital literacy, tailoring teaching methods to the digital era, and nurturing a resilient culture. The study underscores the significance of visionary leadership and strategic planning among school leaders, facilitating a smooth transition into the digital age. Additionally, it highlights school leaders' pivotal role as guides, mentors, and catalysts for change, fostering an environment where teachers feel empowered to experiment and take risks. This research significantly impacts educational policy and practice. With increasing recognition among teachers of technology's transformative potential in the classroom, school leaders must utilize their management skills to ensure teachers are prepared to meet the evolving needs of modern education.

Keywords: *fourth industrial revolution, qualitative-phenomenological approach, coding, thematic analysis*

Introduction

Education and new learning innovations have been significantly impacted by technological advancements. As time moves in the Fourth Industrial Revolution, the Philippine government strives hard to cope with this digital era. School principals face significant obstacles when attempting to integrate technology into the educational environment, including inadequate staff development, lack of knowledgeable leadership, and pedagogical concerns. Since school leadership is one of the key determinants of student outcomes and effective school management is heavily reliant on school leaders' management competencies, there is an urgent need to investigate school leaders' competencies to prepare students. School administrators have had the difficult task of developing a successful learning ecosystem to get pupils ready for the Industrial Revolution 4.0 era as the main change agents in school reforms.

Globally, the education of Indonesia faced challenges in the global era of Industry 4.0 in 2020 where the capital needed to enter and dominate the 21st-century industrial revolution 4.0 must have critical thinking skills, creativity and innovative capabilities, ability and communication skills, ability to cooperate and collaborate, and confidence. Ideal principal leadership is also necessary for answering the challenges of globalization (Mohammad, 2019). Also in Turkey, it is believed that operationalizing the features and content of Education 4.0 would help guide implementation. Accordingly, based on the design and operation of the Turkish educational system, specific implementation ideas were created to ease the transition to Education 4.0. (Beyza, 2020). Additionally, the educational ecosystem in Malaysia is no exception to the Industrial Revolution and to address these new needs and enable the education sector to remain relevant and efficient in a constantly changing environment, education 4.0 has been created (Kin & Kareem, 2019).

Thus, the 4th Industrial Revolution is pushing educational leaders globally to evolve their leadership strategies, so they may be able to support personalized learning for creativity, innovation, and problem-solving and have more time for individual instruction.

Meanwhile, a significant challenge has been provided by Industry 4.0 to the Philippine educational system. Since education must reflect the world it is training students for, school leaders are posed with the challenge of Education 4.0 and how schools can ensure that the teaching-learning experiences will take advantage of the limitless opportunities created by advanced technology. Pangandaman et al. (2019) purported that the educational system must provide automated, networked, virtualized, and flexible international learning environments and experiences in order to serve Industry 4.0. In order to address technical gaps, it is also important to strengthen the systems for education and training in order to create a workforce with greater educational attainment and to create a trainable human resource (Philippine Institute for Developmental Studies, 2019). In light of COVID-19, the study's recommendations to improve digital platforms, online/distance learning, widespread digital capabilities, and simulation-based learning have become more pertinent (Asian Development Bank, 2021).

In the Division of Davao Oriental particularly in Lupon West and Banay-Banay Districts, based on my observation during virtual

meetings, webinars etc., many school heads and teachers are digitally challenged. As shared by most school leaders, they are battling a variety of difficulties in the classroom, including issues with culture, diversity, and resource limitations and even in the delivery of instruction with the integration of technology that is needed in the advent of Industry 4.0. Despite the government's success in providing ICT infrastructure for the integration of technology in classrooms, there are still a lot of factors that prevent its full implementation and contribute in the under-utilization of these facilities to the disadvantage of the teachers and even the students.

Furthermore, in my literature reading, it shows that leaders who keep up with technology leaders must have the skills to motivate people to take part in the Fourth Industrial Revolution's impact on the implementation and development of education (Fatah, et al., 2019). Also, in the study of Haron (2020), emphasized that schools should remain motivated and pertinent to the shifting market realities, education and labor policy need to be reviewed. The foundation for Teaching in IR 4.0, which will be the focus of Education 4.0, was established by Xing and Marwala (2020), in the same context which include teaching-learning and training, research, and service. Despite the fact that good school leadership is required in the age of Education 4.0, none of those studies cited have explored the management competence of school leaders in keeping the pace of Industrial Revolution 4.0 Era which will be focused in this study. Additionally, none of the articles I studied addressed the same qualitative research in detail as the study I would do locally. I am thus inspired to conduct the investigation more.

The results of this study may find out effective ways to develop a strategic plan for ensuring high-quality practice in the 4.0 Industrial Era which is inevitable in today's society particularly in public secondary schools. The conduct of this study is urgent since it will explore and understand the experiences, coping mechanisms and insights of school heads of Lupon West and Banay-Banay Districts as well as their management competence in influencing and supporting teachers in the demands of Industry 4.0.

Likewise, the findings of this study could be used as a basis for policy formulation or strategic actions to enable education institutions to meet the requirements of Education 4.0. It is the intent of this study to determine the readiness of these education institutions in the division of Davao Oriental for Education 4.0 in various areas as perceived by the school administrators. It is critical to resolve any implementation-related problems and call on the need for learning institutions to keep abreast of the latest trends and come up with new and responsive ways to enhance teaching and learning.

Research Questions

Specifically, this study sought to answer the following questions:

1. What are the lived experiences of School Heads on management in the age of industrial revolution 4.0?
2. How do school heads cope with the challenges they encountered on management in the age of industrial revolution 4.0?
3. What insights can school heads share to others on management in the age of industrial revolution 4.0?

Methodology

Research Design

This study used a qualitative technique and a phenomenological framework. It examined the uniqueness of individuals' lived situations through interviews with a group of people who could speak from personal experience on an occasion, circumstance, or experience and outsourced information from other data such as documents and observation (Creswell et al., 2019). Using a variety of methodological traditions of inquiry, Creswell defined qualitative research as an exploration process of knowing that focused on a social or human issue. The study was carried out in a natural context while the researcher constructed a sophisticated, thorough picture, analyzed language, reported information about informants, etc. The qualitative study was the most useful in this research since it described the school heads' actual experiences with management competency during the fourth industrial revolution, the difficulties they faced, their coping techniques, and their perceptions of the problem.

In addition, in order to remove prejudices and preconceived notions about human experiences, feelings, and responses to a certain scenario, this study used phenomenology as a technique. It did not reject outright some notion of objectivity, in credence to Holloway (2019). In the context of this study, a qualitative phenomenological research design was utilized because information was collected from interviews regarding people's real-world experiences of school heads on management competence during the fourth industrial revolution. The phenomena were interpreted, analyzed, and understood using all the data that was collected and described substantially.

The study's qualitative research design performed the best as it described the management competence of the school heads in the IR 4.0 Era. These school heads were also those who managed and acted as the main implementers of school activities in the IR 4.0 era—the difficulties they faced, their solutions, and their perceptions of the problem. Phenomenology was the appropriate methodology for this study since it sought to define the essence of a phenomenon by learning about the lived experiences of school leaders who were engaged in it. In this study, their experiences as school leaders were described in terms of both what they encountered and how they felt about it.

Additionally, this study employed a qualitative phenomenological research methodology because the relevant data were collected through interviews, specifically In-depth Interviews (IDIs), about the management competence of school heads during the fourth industrial revolution, adhering to the validity of the research and moral issues. The data were evaluated and thematically analyzed to

comprehend the phenomenon being studied.

Participants

This phenomenological investigation involved ten (10) school heads who were employed at public secondary schools in Lupon West District and Banay-Banay District in the Division of Davao Oriental. The ten (10) participants underwent in-depth interviews. In terms of participants, this study adhered to the idea of Patton (2019) that a qualitative inquiry may be carried out with 2 to 10 individuals and that this sample size is sufficient to adequately saturate the study's data. Influenced by this idea of Gray (2019), I used these screening criteria to find potential participants: being assigned as the school head or administrator of the school; School heads could manage a school or have been assigned as an administrator at any public secondary grade level within the range of seventh to twelfth grade, including school principals or assistant school principals and head teachers who managed schools in Lupon West District and Banay-Banay District. For this study's exclusion criteria, the amount of experience or whether they had an advanced degree had no impact on their candidacy.

In this study, purposive sampling was used to identify school heads who served as the participants of the study. In qualitative research, purposeful sampling is frequently employed and well-liked for finding and choosing information-rich examples connected to an interesting event (Babbie, 2018). According to Creswell et al. (2019), purposive sampling is a technique that involves locating and choosing individuals or groups of individuals who have specific expertise in or experience with an interesting phenomenon. In this study, the researcher practiced fairness and treated all prospective participants the same, providing an equal opportunity to participate in the study regardless of gender, age, work experience, or background. All prospective participants who met the research criteria were given an equal, formal opportunity to take part in the research.

Instrument

There are numerous techniques to obtain data sources. There are fundamental ways to collect qualitative data, including interviewing, observing, and recording audio and video sources (Creswell, 2019). In the setting of this study, the responses from the in-depth interviews are the info sources to be used for this study. In-depth interviews are ideal for collecting data on individuals' personal history, experiences, and points of view, particularly when tackling issues or topics like the school heads' experiences in terms of management competence during the fourth industrial revolution. Data were collected specifically in participant settings, particularly in Lupon West District and Banay-Banay District, a division of Davao Oriental, Philippines.

In essence, the research subjects from the many public secondary schools where this study was done are my sources of data. I utilized a recorder to make sure I understood their comments correctly and prevent them from being changed or misunderstood. I recorded every step of the data collection process, including their responses, their body language, and the terms they emphasized.

Procedure

It was viewed by Vogt (2019) that in the process of data collection, one must be practical but also be guided by the nature of the research problem and the characteristics of the respondents. In order to gather exact data, as a researcher, I took careful steps and cautious analysis in gathering and collecting the responses of school heads in terms of management competence in the age of Industrial Revolution 4.0.

In this study, I secured first the endorsement and approval of the Research Ethics Committee (REC) of St. Mary's College, Inc. Second, I sought the endorsement letter from the Dean of the Graduate School. The Dean's letter of support and the REC's certificate of approval were signs that I was permitted to carry out the study. Third, I submitted a letter to the superintendent of the school's division requesting authorization to carry out the study and to inquire about the lived experiences of school heads about management competence during the fourth industrial revolution in selected public secondary schools in Lupon West District and Banay-Banay District in the division of Davao Oriental. Likewise, I also obtained permission from the school principals to conduct in-person interviews with them as my study's main subjects.

The participants' consent was obtained as the fourth procedure. An Informed Consent Form (ICF) was given to each participant from the participating school to explain the goal and other pertinent information of the study, particularly the nature of their participation. The ICF was sent and collected with all required signatures. Asking participants for their consent to record their in-depth interview responses was a crucial part of the ICF process. To ensure that participants fully understood the research process and the extent of their involvement prior to their voluntary participation, a virtual orientation was done following the IATF health and safety protocols.

Data Analysis

All interview transcripts were converted into written forms for further analysis after the data had been collected. To present a comprehensive picture, this qualitative data was evaluated and looked at all at once. This study made use of coding and thematic analysis to analyze the data collected and gathered. Coding and thematic analysis are the two common approaches in data analysis for this qualitative study (Ferguson, 2020). In this study, I went over the responses of my participants and familiarized myself with them so that the typical responses could be quickly found. Then, by grouping related participant experiences and common participant replies, I discovered a number of themes.

Initially, transcripts were read and reread, and as major themes or thoughts arose, notes were taken. Categories, which are subsets of concepts, were recorded and integrated gradually into the context of the larger themes. Since the majority of the participants in this study spoke a vernacular language, the data were first translated before being analyzed thematically. I first listened to the participants' audio interviews before transcribing their words as I coded the data. I reviewed and acquainted myself with their answers so that I could quickly recognize the typical ones. Then, by grouping frequent responses to the participants' experiences, I isolated many themes. I also took into account the methods of coding and thematic analysis. A verbatim transcription of each core idea was used to support each major topic after the fundamental ideas had been organized into themes. After I determined the themes, I wrote about the various experiences of the participants in light of the key responses and themes. I created an audit trail to record the key themes.

Ethical Considerations

According to Belmont's Report, "basic ethical principles" are those broad judgments that serve as the justification for a variety of ethical suggestions and analyses of human conduct. Additionally, a large portion of modern research also addresses legal and ethical issues (Yip et al., 2019). Respect for persons, beneficence, and justice are three essential values that are particularly relevant to the morality of research involving human subjects. Since the participants of this study were school heads who had firsthand experience with management competence during the fourth industrial revolution, I abided by the moral principles outlined in Belmont's Report.

According to the first principle, respect for persons, study participants should be viewed as autonomous individuals who are free, responsible, and able to make their own decisions if given the information to do so. The foundation of informed and explicit consent is this principle (Creswell, 2019). I utilized informed consent in this study, which entailed fully disclosing all risks and benefits to the participants before letting them decide whether to participate. I detailed the participant's right to withdraw from the study and its objectives and the methodologies used, confidentiality statements, and our signatures as the researcher and the participant in the permission form. I also asked them if I could videotape the conversation. Additionally, I made sure that the persons who participated in my research did so voluntarily, without being forced to, and I let them know they had the right to review and edit the transcript I created.

The second concept, known as the principle of beneficence, is related to putting safeguards in place to protect the well-being of study subjects or minimizing both possible benefits and harms of the study. Since there are dangers and advantages to all studies, it was important to make sure that they were balanced. Benefits of research included the chance to make friends information or education obtained through participation, the opportunity to interact with the researcher or other participants and make a positive contribution to society, or the ability to win the respect of others (Creswell, 2019). The entire school community, especially the school administration, could benefit from the study's findings. To protect the privacy of their answers and to ensure that their identity could not be determined through coding and anonymity, I employed IDI in this study. Additionally, I made sure that the research's findings were advantageous to my research participants, particularly other school heads in terms of management skills for the fourth industrial revolution.

The third and last principle of the Belmont Report is justice. All demographic groups (race, gender, ethnicity, age, etc.) were subject to the same risks and benefits of the study, hence individuals should only be included or excluded for reasons relevant to the research questions or hypotheses (Adams, 2019). I made sure that, as indicated, all the guidelines for defending the rights of my study participants were followed. I made sure the volunteers did not have to spend any money, and I thanked them for helping me finish my research. By correctly citing their comments and accurately expressing their own perspective, the time, energy, and other resources that the participants of this qualitative study gave were acknowledged. Finally, the study's findings were provided to the participants to tell them of their involvement in the study as well as its findings, which would be to their advantage in a variety of ways.

Furthermore, this study adhered to Republic Act 10173, otherwise known as the Data Privacy Act of 2012; a law that seeks to protect all forms of information, be it private, personal, or sensitive. It also entails three conditions about personal information: 1) must be collected with specific and valid reasons. 2) must be handled properly. 3) must be discarded in a way that does not make it visible and accessible to unauthorized third parties. In the context of my study, all the data gathered was only used for the purpose of this research. To protect the participants, I utilized pseudonyms and blackened confidential information on the ICF as ways to conceal their personal identity. With this, I was certain that their anonymity and privacy were maintained, which are takeaways in maximizing the data processing security. Also, to ensure data privacy, I conducted the online interviews in a closed, quiet, private room with the aid of earphones. This was done to ensure that I was the only person who had complete access to all the data collected throughout the study.

Concurrently, to handle the data properly, all digital files were kept in an encrypted folder on a password-protected computer. Also, printed copies of data were secured in a locked cabinet. These files could only be accessed by research bodies namely: the principal investigator, REC, and other regulatory bodies for verification purposes and validation of procedures. These files should only be retained if reasonably needed; thus, discarding them once the study is completed to prevent unauthorized persons from accessing the data. Also, as their concepts were utilized in this work, all authors were appropriately cited. In order to properly credit and acknowledge the contributions of the authors listed in this study, I adopted the APA referencing style.

Results and Discussion

This section will present the study’s findings about the management skills of school heads in the context of IR 4.0. The data and results

obtained from the interviews were examined and organized by the order of the study's research questions. In addition, it described the analysis of the gathered data resulting from the participants' responses in the in-depth interviews which the researcher carefully read and verified with the guidance of the thesis adviser and data analyst.

Lived Experiences of School Heads on Management in the Age of Industrial Revolution 4.0

Amidst the Fourth Industrial Revolution (IR 4.0), the responsibilities of school heads in education have transcended mere administrative supervision. These educational leaders are now leading a revolutionary journey, where the incorporation of cutting-edge technologies, the development of essential skills, and the adjustment to a constantly evolving digital environment are of utmost importance. Solely excelling in traditional management approaches is no longer adequate for school heads; instead, they must possess a deep understanding of the complexities of IR 4.0 in order to effectively lead their institutions into the future. Accordingly, the following themes emerge from the responses pertaining to the lived experiences of the participants on their management competence in the age of revolution 4.0 : (a) utilizing the new technology, (b) equipping teachers with modern technology, (c) leading to learn the new system and (d) Struggling with the Technology Integration in Education. Table 1 shows the major themes and core ideas on the different experiences of school heads in the age of industrial revolution 4.0.

Table 1. *Major Themes and Core Ideas on the Different Experiences of School Heads in the Age of Industrial Revolution 4.0*

Major Themes	*Core Ideas*
Struggling with the Technology Integration in Education	• Was surprised with the sudden change in education • Lacked training to fully absorb technology in education • Faced added difficulty in complying with the modern approach to a lack of technology • Experienced no or unstable internet connectivity in far flung areas
Utilizing the New Technology	• allowed teachers use social media for the teaching learning process • Provided easier access to DepED memos • Reminded teachers to consistently use modern way of teaching methods • Conducted meeting with teachers through webinars • Integrated new technologies with the traditional educational ideals • Utilizing varied online platforms for easy communication
Equipping Teachers with Modern Technology	• Improved the technological and digital needs of the school • Provided classrooms with television set • Exposed teachers to online trainings • Partnered with varied technology companies
Leading to Learn the New System	• Embraced the changes and challenges brought by new technology • Navigated and accepted changes • Worked on addressing digital gaps among teachers and students • Attended seminars to learn how to use the modern gadgets

Struggling with the Technology Integration in Education

Digital classrooms are becoming more accessible, so they may explore work-life balance. As education evolves in the digital age, school administrators must integrate technology successfully. Technology has the potential to improve learning, administrative processes, and 21st-century readiness, but it also requires adapting to new tools, addressing budgetary constraints, and ensuring equitable access for all students.

IDI-01 emphasized the inevitability of change and the need for adaptability as she stated:

"First, we are surprise as we are not familiar with this and this is new that's. Why we are not aware and this shift is immediate. We think na baka hindi naming kaya kasi we immediately faced the challenge and hindi namin alam ang mga gagawin noong una kaya inaral nalang din naming ang mag adjust sa mga ganitong bagay as change is constant."

(First, we were surprised because we were not familiar with this new situation. It was something entirely new to us, and the shift happened suddenly. At first, we thought we might not be able to handle it because we were immediately confronted with challenges, and we did not know what to do initially. So, we had to learn how to adjust to these changes because change is constant.)

In addition, IDI-03 highlights the challenges and shortcomings in the integration of technology into education.

"Actually isa sa mga naeencounter nila struggling to find knowledge on the best way to adapt this evolution although nagagamit na soya sa school Hindi siya properly implemented. Wala pang maayos na implementation although nakakagamit naman sila ng technology kailangan pa din ng trainings tapos kulang pa sa facilities and internet connection. Hindi pa siya totally naaabsorb fully sa education."

(Actually, one of the challenges they encounter is struggling to find the knowledge on the best way to adapt to this evolution. Although technology is being used in the school, it is not properly implemented. There is still no well- structured implementation, even though they have access to technology. They still need training, and there is a shortage of facilities and internet connection. It has not been fully integrated into education yet.)

Furthermore, IDI-06 highlights teachers' challenges in implementing modern technology and instructional methods as she said:

"As for me it's difficult as not all teachers owned persona laptop or computers even this time some of the teachers are having difficulty to comply with the modern approach."

Moreover, IDI-02 shared about the challenge of internet connectivity in a remote school location aa she added:

"One of the difficulties is having internet connection as out school is located far away from the Poblacion. Basically, connectivity is the issue that providing us to adapt the system."

Apart from this, IDI-04 points out the impact of the abundance of knowledge and digital distractions on students as she stated:

"The amount of knowledge and digital distractions has made it hard for students to stay focused on their studies and be interested in them. Keeping a healthy balance between time spent online and time spent offline is a worry."

As mentioned by the participants, they share their first obstacles and surprising experiences during the rapid transition to technology in education, as well as their solutions. They may also discuss the training and tools that have helped educators use technology better in the classroom. Therefore, these discussions would reveal the pros and cons of educational technology.

Utilizing the New Technology

The participants deliberated on the continuous evolution in education propelled by the incorporation of technology. The initial phase of the conversation unveiled that educators are embracing the utilization of computers, gadgets, and social media as instructional tools, signifying a transition towards contemporary, technology-centric teaching approaches. This highlights the crucial need for ongoing support and training for teachers across all age groups.

Expressively, IDI-O1 shared that:

"So far as of present we are computer literate nagagamit nila ang mag gadgets nila sa kanilang mga classroom and social media sa kanilang teaching learning process. Na- experience nila na hinay hinay ang adaption dito sa Industrial Revolution."

(As of now, we are good with computers. They use their gadgets in their classrooms and on social media for teaching and learning. They have slowly adapted to the changes brought by the Industrial Revolution.)

Also, IDI-02 explores the preparedness to assume the responsibility of overseeing the school amidst a technological revolution as she stated:

"I think experiences during my time I could say that this is an opportunity for me to handle the school during this time. Kasi under this revolution it is easier unlike dati na kailangang magpunta ng division office to get the memorandum orders and we are so lucky to have this change but kagaya ng iba may advantage and disadvantage pero mas marami ang advantage. Just like here in our school poor internet connection, brownout and as school head we are looking for three function which are instruction, fiscal management and financial management."

(I believe that the experiences I've had during my time here have prepared me for this opportunity to manage the school. Under this revolution, it's easier compared to before when we had to go to the division office to obtain memorandum orders. We are fortunate to have this change, although like anything else, it comes with both advantages and disadvantages. Just like in our school, we face challenges such as poor internet connection and power outages. As the school head, we are focused on three key functions: instruction, fiscal management, and financial management.)

Apart from that, IDI-04 highlighted the use of webinars and remote communication methods during the pandemic:

"During pandemic time since we have no face to face most of the time when I conducted my meetings it is through webinars and most of my teachers do the same since they are not required to go to school."

In support to the 1st theme, IDI-03 shared her experience as she stated:

"I am always reminding the teachers about the use of this system in modern way teaching, and I also ask help from teachers for those things that I do not know. As a 59 years old head teacher I am having difficulty to use gadgets."

Furthermore, IDI-08 stressed the necessity to balance traditional educational practices with new technologies.

"In our lives, we've had to find a balance between keeping traditional educational ideals and incorporating new technologies. It's about giving our students a feeling of continuity while also being open to change."

In conclusion, incorporating new technology into education can enhance the overall effectiveness and efficiency of educational systems. This allows students in remote areas to access the necessary knowledge and skills for a more promising future, while also contributing to the establishment of fair and inclusive societies. In order for educators in remote areas to fully leverage current technology, it is crucial to ensure equitable access to these devices and provide them with adequate training

Equipping Teachers with Modern Technology

The participants emphasized the crucial role of school administrators or other educational leaders in guiding and facilitating technological advancements in the classroom, as indicated by their comments. Furthermore, they highlight the importance of effective communication and assistance by emphasizing the necessity of ensuring that teachers fully grasp the objectives and benefits of technological innovations. Moreover, the mention of utilizing the internet for convenient communication emphasizes the role of technology in fostering efficient and fruitful collaboration among educators. The concept of embracing novel technology and demonstrating adaptability to its challenges and modifications is also emphasized, underscoring the imperative for educational leaders to guide by adopting state-of-the-art instructional approaches.

IDI-02 emphasizes the management of educational processes during the COVID- 19 pandemic:

"First, I manage it with conscience and with the guidelines given to user in accordance with the IRR more likely on implementing the modes of learning in the covid 19 years. But there are two kinds of management based on deadlines and based on situation. Uplifting the technological and digital aspect of the school."

Consequently, IDI-05 also added:

"Always see to it that I provide my teachers the technology and necessary equipment right now I am trying to have a classroom with TV so teachers can concentrate on discussing their lessons. Kasi noon may mga teachers na whole time period copy it right now hindi na siya ganoon mas Maganda kung magagamitan ng modern approach."

(I always make sure to provide my teachers with the necessary technology and equipment. Right now, I am working on setting up classrooms with TVs so that teachers can focus on delivering their lessons more effectively. In the past, some teachers had to spend the entire class period copying materials, but now it's better if we can utilize a more modern approach.)

Similarly, IDI-01 shared the use of social media platforms as a means of communication:

"First is we created a group chat an facebook page of the school were we can post school accomplishments and messenger serves as a platform for reminders and other things that needs to cascaded with them."

Futhermore, IDI-04 also stated:

"I observed that teachers more efficient, they are exposed to social media several trainings, and ang technology so on… which is very applicable to their teaching and learning process."

Moreover, IDI-10 recounted his experience on addressing the challenges posed by Industry 4.0 as he added:

"To deal with the challenges of Industry 4.0, we made partnerships with tech companies and invited speakers from different fields to talk to our students about how new technologies are being used in the real world."

In general, giving teachers access to technology is essential to improving the quality of instruction and preparing students for the challenges of the twenty-first century. Educators can create engaging and adaptable lessons by utilizing interactive whiteboards, iPads, educational software, and online resources. These technologies facilitate teachers in effectively monitoring their students' progress, providing them with prompt feedback, and tailoring their lectures to cater to the individual needs of each student. Moreover, modern technology allows educators to continuously enhance their professional skills by keeping up with emerging trends in education and pedagogy. Ultimately, equipping teachers with technology amplifies student learning and equips them with the necessary resources and expertise to navigate an ever-evolving educational landscape.

Leading to Learn the New System

Teachers share their experiences about the best ways to use technology and what they have learned from their mistakes. According to the participants, they are exerting significant effort to modify and enhance the school system, particularly in response to the COVID-19 pandemic and the necessity of integrating technology. Each of them employs distinct methodologies, although they all share a common objective of enhancing the process of education.

To support the theme, IDI-01 shared his experience of adapting to a sudden and unfamiliar situation, marked by challenges and the need to learn how to cope with change as he stated:

"First, we are surprise as we are not familiar with this and this is new that's. Why we are not aware and this shift is immediate. We think na baka hindi naming kaya kasi we immediately faced the challenge and hindi namin alam ang mga gagawin noong una kaya inaral nalang din naming ang mag adjust sa mga ganitong bagay as change is constant."

(First, we were surprised because we were not familiar with this new situation. It was something entirely new to us, and the shift happened suddenly. At first, we thought we might not be able to handle it because we were immediately confronted with challenges, and we did not know what to do initially. So, we had to learn how to adjust to these changes because change is constant.

Also, IDI-03 added:

"You have to navigate to these changes since I was a product of traditional approach so we should accept these changes."

Comparably, IDI-04 shared her experience on the effort to bridge the digital divide as she stated:

"A big part of my experience has been working to close the digital gap and make sure everyone has the same access to technology. We've worked to close this gap so that all of our kids have the same chances."

Lastly, IDI-06 acknowledged her lack of proficiency in using gadgets as she said:

"As I have said I am not good in the use of gadgets cause I am not tech savvy and to help myself I am attending seminars to learn on how to use it."

In conclusion, overseeing a school system change is crucial. Leaders need a vision, flexibility, and the ability to engage and empower students, teachers, and partners to create education's future. Technology aids learning in this new system. Leaders must provide teachers with the necessary tools and training. Individual learning is also growing. This approach caters to individual students' requirements and pace learning. School leaders should encourage these strategies and create an environment that suits each student's interests and talents. Students need a global perspective to prepare for a linked world. Curriculum must foster global awareness and intercultural competence.

Ways of School Heads in Coping with Challenges Encountered on Management Competence in the Age of Industrial Revolution 4.0

The sector of education is always changing, therefore it's critical to be open to new ideas and embrace digitalization. The main topics of this conversation are working with stakeholders, advocating for digitization in education, and adopting a positive outlook on change. A positive outlook on change is essential for the effective incorporation of technology into the classroom. A major factor in the acceptance of new technology is educators' willingness to learn and embrace it. This hope is especially important given the "new normal" in schooling. Accordingly, the following themes emerge from the responses of the participants as their ways of coping with challenges encountered on management competence in the age of Industrial Revolution 4.0: (a) embracing change positively, (b) advocating digitalization and (c) fostering collaboration with stakeholders. Table 2 shows the major theme and core ideas on the ways of school heads in coping with challenges encountered on management competence in the age of Industrial Revolution 4.0

Table 2. *Major Themes and Core Ideas on the Ways of School Heads in coping with Challenges Encountered on Management Competence in the Age of Industrial Revolution 4.0*

Major Themes	*Core Ideas*
Embracing Change Positively	• assisted those willing to know more about technology • stayed optimistic in accepting change brought by new normal • motivated everyone to adapt to change • used adaptive leadership to deal with uncertainty • developed culture of flexibility and resiliency
Advocating Digitalization in Education	• designated people to implement coping activities • conducted orientation trainings on the use of technology • convinced people in the school the advantages of digital age in education • utilized additional MOOE to address teachers needs in the digital age
Fostering Collaboration with Stakeholders	• Involved everyone in the process • Inspired by the flexible attitude of the teachers to learn new things • Showed a strong support system in the school for better communication

Embracing Change Positively

The participants stressed that maintaining a positive attitude toward change in the educational environment is crucial for effectively navigating the opportunities and challenges presented by the Fourth Industrial Revolution 4.0. Given the rapid advancements in technology and automation, school heads foster a mentality that values open-mindedness, adaptability, and continuous learning. Instead of harboring concerns about potential job loss, school heads perceive the Fourth Industrial Revolution as an opportunity to acquire novel proficiencies and enhance existing ones.

IDI-01 the positive impact of training on teachers' ability to adapt to changes brought by the internet.as she stated:

"Since we have trainings, it really helped teachers to adapt with the changes brought by the internet as everyone is willing to assist anyone who wants to know more about the internet."

Similarly, IDI-07 implied about the willingness to learn and adapt to technology as stated:

"As I have said work in grace, I think one of the difficulties is cope with the technology but I am willing to learn and adapt with the technology and changes and enjoy it."

IDI-02 also stated:

"First is optimist with the changes and always focused on the goal and stay calm"

Moreover, IDI-03 emphasizes the initial difficulties in adapting to transition from physical to digital methods in education

"Actually isa sa mag challenges tong digitalization, from physical to digital, parang and very challenging but then because ang teachers ay may attitude na madani lang silang matututo flexible so as the administrators and the school managers little by little madali ng nakakacope up."

(Actually, one of the major challenges is this transition to digitalization, shifting from physical to digital methods. It seemed very challenging at first, but because teachers have the attitude that they can learn and adapt, and administrators and school managers are also becoming more flexible, little by little, they are coping with the changes more easily.)

In addition, IDI-05 gives emphasis in motivating everyone as she stated:

"You have to motivate everyone to adapt."

Also, IDI-08 shares the effectiveness of applying the principles of adaptive leadership as she stated:

"Using the principles of adaptive leadership has helped us deal with uncertainty and make our schools and staff more open to change."

Furthermore, IDI-10 stressed the importance of cultivating a culture of flexibility and resilience within the school group.

"It has been very important for our school group to develop a culture of flexibility and resilience. These traits help us deal with problems that come up out of the blue and keep giving good education."

As mentioned by the participants, a positive attitude makes people more likely to use new technologies, which in turn helps students develop their creativity and ability to solve problems. Additionally, being ready to adjust to new situations is helpful for people and helps society move forward. The future workforce will be able to use the transformative power of technologies like robotics and artificial intelligence because they are flexible. This will lead to a more prosperous, sustainable, and inclusive future.

Advocating Digitalization in Education

School heads highlighted that one ground-breaking initiative that has the potential to fundamentally alter how we teach and are taught is to support digitization in education. Utilizing technology in the educational setting provides students with a plethora of knowledge and interactive resources, hence augmenting and customizing the learning process. Using this tool, the participants create captivating courses that are based on data and cater to different learning styles, while also fostering students' analytical thinking and problem-solving skills.

IDI-01 gives emphasis on the importance of structured planning and organization:

"There should be a great planning defining the activities and implementation and designate people with their specific functions."

In addition, IDI-03 highlights the importance of providing orientation and training as she stated:

"So as to strategies, number 1 is that to cope up with this challenges data may orientation about this industrial evolution. Some of us not know about this kasi parang ang dating ng term ay nakafocus lang sa businesses tapas ngayon lang soya dumating sa education sang strategy is to have an orientation to understand it we can also organize and facilitate trainings."

(In order to cope with these challenges, the first strategy is to provide orientation about this industrial evolution. Some of us may not be familiar with it because the term used to be associated mainly with businesses, and it has only recently arrived in education. Another strategy is to organize and facilitate training sessions to help everyone better understand and adapt to these changes.)

Similarly, IDI-08 also added:

"Since I have an ICT coordinator, we are conducting trainings on how to use the internet, especially the powerpoint."

Furthermore, IDI-06 promoting a sense of optimism is crucial as she stated:

"Include getting people in our school to believe in the prospects of the digital age and the good things it can do for education."

Likewise, IDI-09 implied the allocation of increased Maintenance and Other Operating Expenses as she stated:

"Nadadagdagan na ang MOOE para masuplayan ang mga needs ng mga teachers at maaddress ang needs ng mga teachers sa revolution."

(The MOOOE (Maintenance and Other Operating Expenses) is being increased to better meet the needs of teachers and address their requirements during the revolution.)

Moreover, as mentioned by the participants, as digitalization transcends geographical boundaries, providing individuals who are disadvantaged or residing in rural areas with equitable opportunities to attend education. Ensuring equitable access to digital resources and providing comprehensive digital literacy training for both instructors and students is crucial. By promoting the adoption of digital technology in education, we create the conditions for a future where information is easily accessible, adaptable, and accessible to all, allowing students to thrive in the digital age.

Fostering Collaboration with Stakeholders

School administrators punctuated that working together with different groups in a school setting is an important and changing part of modern education. Teachers, students, parents, administrators, local communities, and policymakers are just some of the people and groups that need to be involved for the educational school to be successful. This collaborative method is based on the idea that all stakeholders must work together to make a learning environment that is both useful and fulfilling.

IDI-02 stated that:

"Make everyone involved in the process."

In addition, IDI-03 highlighted the difficulties and incremental adjustment involved in shifting from traditional to digital approaches in education, expressing:

"Actually isa sa mag challenges tong digitalization, from physical to digital, parang and very challenging but then because ang teachers ay may attitude na madani lang silang matututo flexible so as the administrators and the school managers little by little madali ng nakakacope up."

(Actually, one of the major challenges is this transitio n to digitalization, shifting from physical to digital methods. It seemed very challenging at first, but because teachers have the attitude that they can learn and adapt, and administrators and school managers are also becoming more flexible, little by little, they are coping with the changes more easily.)

Furthermore, IDI-09 mentioned the establishment of a strong support system in schools as she articulated:

"To deal with problems, participants have set up a strong support system in their schools, which makes it easier for students, parents, and staff to talk to each other."

In a nutshell, open lines of communication facilitate transparency as illuminated by the participants. Working together with stakeholders through a solid support system has far-reaching effects beyond those of simple communication, fostering the growth of an environment conducive to learners' all-around growth. This strategy does more than just solve today's problems; it also builds the foundation for tomorrow's thriving school district.

Insights that School Heads Share to Others on Management Competence in the Age of Industrial Revolution 4.0

Ensuring digital literacy, modifying teaching methods for the digital era, and encouraging a resilient culture are essential components of educational progress in the ever-changing field of education. Overall, the modernization of education revolves around establishing digital literacy, modifying teaching methods for the digital era, and encouraging a resilient culture. These results highlight the value of innovation, adaptability, and ongoing learning in educational settings. Teachers and educational institutions who adopt these ideas will be best positioned to help students succeed in the digital age as technology advances. Results are corroborated by some studies that have been made over time. The swift advancement of contemporary technology has ushered in a paradigm shift in the field of education, necessitating that educators djust to the evolving environment. The following themes emerge from the insights of School heads on management competence in the age of industrial revolution 4.0: (a) Promoting Digital Literacy, (b) Tailoring Teaching Methods to the Digital Era and (c) Nurturing a Resilient Culture.

Table 3. *Major Themes and Core Ideas on the Insights that School Heads Share to Others on Management in the Age of Industrial Revolution 4.0*

Major Themes	*Core Ideas*
Promoting Digital Literacy	• make digital literacy a top priority • train all school heads on the use of internet • improve the implementation of digitalization • teach digital literacy skills in the classroom • welcome change and open to new ideas
Tailoring Teaching Methods to the Digital Era	• revisit teaching strategies and methods for improvement • provide experiential learning using new technology • integrate technology in classroom instruction prepare students face the digital world

Nurturing a Resilient Culture	• use technology in enhancing students' critical thinking, and problem solving • be transparent and flexible to changes • encourage stakeholders to be open to new ideas • be ready always with open mind • learn to use technology efficiently in performing tasks

Promoting Digital Literacy

The participants emphasized that digitally literate workforce is essential in today's technologically advanced society as identified by the participants. In addition to using digital tools, digital literacy includes the capacity to create meaningful content, safely traverse online enviro nments, and critically assess information. The promotion of digital literacy is a complex task for school administrators. They function as the visionary leaders who establish the atmosphere for the entire school community. Within this framework, advocating for digital literacy among school heads is not solely a requirement, but also a crucial priority to ensure educational institutions stay pertinent and adequately equip students for the demands of the 21st century.

IDI-01 stressed the significance of emphasizing digital literacy amongst both students and employees, saying:

"I believe that digital literacy should be a top priority. Both students and workers should work on improving their digital literacy skills. Make sure everyone knows how to use technology effectively and in a responsible way."

Additionally, IDI-02 urged school administrators to use the internet and acquire sufficient training as she said:

"As a school head all of us must be willing to use the internet and we all should be trained properly on how to use it."

Certainly, IDI-04 stressed the dedication to upgrading, improving, and enhancing the process of implementing improvements as she shared:

"I-upgrade kung saan dapat i-upgrade i-enhance at sana mas pagbutihin pa ang implementation nito."

(We should upgrade where necessary, enhance, and strive for continuous improvement in the implementation of these changes.)

Moreover, IDI-05 underscores the promotion of digital literacy in education as she said:

"Encourage teachers to teach digital literacy skills as part of their lessons to promote digital literacy. School leaders can give training programs for teachers and parents to make sure that everyone understands and uses technology well."

Furthermore, IDI-07 stressed creating a school culture that embraces change as she said:

"Help the school create a culture that values being able to shift and welcomes change. Encourage students, teachers, and workers to be open to new ideas and ways of doing things."

cuses on keeping up with new technologies, school trends, and teaching methods as she said:

"Try to get other school heads to think in terms of learning all the time. Keep up with new technologies, school trends, and new ways of teaching."

In conclusion, given how quickly the educational landscape is changing in the modern day, the school heads emphasized the need of digital literacy for school administrators. School heads, as custodians of academic institutions, are not simply administrators but visionary leaders who bear the responsibility of creating the future of education. Embracing and encouraging digital literacy entails more than just staying current with technology advancements; it involves providing students and educators with the necessary skills to succeed in a digital society.

Tailoring Teaching Methods to the Digital Era

Participants illuminated that in the constantly changing field of education, where technology plays a significant role in shaping our lives and careers, teaching methods need to adapt to suit the requirements of the digital era. Educators are redefining traditional methods of information transmission by utilizing digital tools, platforms, and resources to enhance the learning experience. In the current age of fast technological progress, it is crucial for teaching methods to be flexible and responsive. This ensures that students not only acquire basic knowledge but also develop the necessary skills to successfully navigate and excel in a world that is becoming more digital and interconnected.

IDI-02 suggests a reconsideration of the current educational revolution in the school as he implies:

"I would like to suggest to them to revisit the current mode of revolution na iniimplement nila sa school baka nasa 1.0 pa kayo baka luma ang teaching strategies at methods in teaching and administration. Ang suggestion ko talaga ay irevisit nila talaga at magconduct ng assessment kung effective pa ba ito to improve dahil kung hindi mag aadapt posibleng hindi na magperform ang teachers at ang buong school.

(I would like to suggest that they revisit the current mode of the revolution being implemented in the school. It's possible that they are still using outdated teaching strategies and administrative methods. My recommendation is for them to conduct a thorough assessment to determine if it's still effective and make necessary improvements. Failing to adapt could potentially lead to underperformance among teachers and within the entire school.)

IDI-05 also added:

"Provide experiential learning experiences for them to be used with the new technology."

IDI-06 emphasizes the critical importance of seamlessly integrating technology into the classroom:

"Stress how important it is to integrate technology into the classroom in a smooth way to help students learn better and get ready for the digital world."

IDI-10 highlights the importance of leveraging digital resources as she stated:

"Tell teachers to make projects that require students to use critical thinking, problem-solving, and imagination while using technology as a tool."

The participants deliberated about the reassessment of the existing educational approach at the school, highlighting the possible utilization of antiquated teaching methods. They highlighted the conduct of a comprehensive evaluation to determine the level of efficacy and suggest enhancements to prevent subpar performance. School heads focused on offering hands-on learning opportunities with cutting-edge technology, prioritizing seamless integration of technology to enhance management competence among school heads and prepare them for the digital era, and instructing teachers to design projects that cultivate critical thinking, problem-solving, and imagination by utilizing technology.

Nurturing a Resilient Culture

As mentioned by the participants, schools struggle with the multiplicity of opportunities and problems brought forth by the digital age, it becomes increasingly clear how important it is to foster a resilient culture within the educational framework as mentioned by the participants. They also emphasized that the Fourth Industrial Revolution (IR 4.0) acts as a catalyst for transformative transformations, necessitating a major alteration in the approach to education. In this ever-changing environment, resilience becomes a crucial quality for both educators and learners. It goes beyond being only a way to deal with problems; instead, it develops into a proactive approach, an inherent aspect of the school's values and beliefs.

IDI-04 implies that:

"Being transparent in your job and being flexible with changes."

IDI-07 emphasizes on encouraging students, teachers, and staff to be open-minded and receptive.

"Help the school create a culture that values being able to shift and welcomes change. Encourage students, teachers, and workers to be open to new ideas and ways of doing things."

IDI-08 said that:

"We should be ready all the time about this and open mindedness.

IDI-09 implies the necessity to utilize technology effectively as she said:

"We must learn on how to use the technology efficiently to perform your tasks accordingly."

In general, participants implied that resilience becomes not only a way to cope, but also a powerful force that enables the school community to adjust, create new ideas, and thrive in the ever-changing environment of the Fourth Industrial Revolution. It involves accepting change, promoting adaptability, and cultivating a mindset that perceives adversities as chances for personal development. By placing a high importance on building resilience, schools may effectively and skillfully adapt to the uncert ainties brought about by the digital age. This will ensure that both teachers and students not only come out of it without harm, but also with the ability to flourish in an era characterized by rapid technological advancements.

Conclusions

This phenomenological investigation delves into the experiences of school administrators within the ever-changing context of the Industrial revolution 4.0. As a result, we have acquired a more profound comprehension of the management skills they consider crucial for successful leadership in this era of profound transformation. The study has uncovered a variety of interconnected themes that emphasize the crucial importance of strategic planning, decision-making, communication, leadership, resource management, organizational efficiency, adaptation, and innovation in successfully navigating the intricacies of Industry 4.0.

The school heads have provided a clear description of the difficulties and possibilities they encounter in adjusting to the fast-paced

technological progress, changing educational requirements, and decision-making based on data that are characteristic of Industry 4.0. Their observations have highlighted the significance of ongoing education, cooperation, and a mindset focused on personal development in enabling school leaders to guide their institutions through this phase of change.

This research has not only yielded useful insights into the managerial competencies of school heads in Industry 4.0, but it has also established the groundwork for future research and initiatives aimed at professional development. By comprehending the distinct encounters and viewpoints of school princi pals, we can create customized training initiatives and support.

References

Adams, T. E. (2019). A Review of Narrative Ethics. Sage Journal.

Ajzen, O. (2019). Industry 4.0 Operators: core knowledge and skills. Advances in Science, Technology and Engineering Systems Journal, 5(4), 177-183.

Aravena-Gaete, M., Campos-Soto, M., & Rodríguez-Jiménez, C. (2020). Learning Strategies at a Higher Taxonomic Level in Primary Education Students in the Digital Age. Sustainability. https://doi.org/10.3390/su12239877

Armenakis, A.A., & Bedian, A. (2019). Organizational change: A review of theory and research in the 1990s. Journal of Management.

Asian Development Bank (2021). Reaping the Benefits of Industry 4.0 through Skills Development in the Philippines.

Asimov, E. G., & Shchukin, A. N. (2019). New dictionary of methodological terms and concepts (the theory and practice of language teaching).

Avidov-Ungar, O., & Eshet-Alkakay, Y. (2021). Teachers in world of change: Teachers' knowledge and attitudes toward the implementation of innovative technologies in schools. Interdisciplinary Journal of E-Learning and Learning Objects.

Babbie, E. (2019). The basics of social research (7th ed.). CENGAGE Learning Custom Publishing.

Baker, R. S., & Yacef, K. (2019). The state of educational data mining in 2009: A review and future visions. Journal of Educational Data Mining, 1(1), 3-17.

Beal, R. and Yi, Y. (2019). On the evaluation of structural equation models. Journal of the Academy of Marketing Sciences, 16, 74-94.

Becker, H. S. (2019). Creativity Is Not a Scarce Commodity. American Behavioral Scientist

Beyza, C. (2020). Education 4.0: Defining the Teacher, the Student, and the School Manager Aspects of the Revolution. Turkish Online Journal of Distance Education, IODL, 12-28 .

Bharwani, S. (2020). What you need to lead in the Industry 4.0.

Boyatzis, R. E., (1998). Transforming qualitative information: Thematic analysis and code development.

Brion, C. (2020). Leading change for school improvement: a case study. International Journal of Teaching and Case Studies. https://doi.org/10.1504/ijtcs.2020.10028320.

Brixner, C.; Isaak, P., Mochi, S., Ozono, M., Suarez, D., and Yoguel, G. (2020). Back to the future. Is industry 4.0 a new tecno-organizational paradigm? Implications for Latin American countries. Economics of Innovation and New Technology, 29(7), 705-719.

Brown-Martin G. (2020). Education and the Fourth Industrial Revolution.

Cerika, A., and Maksumic, S., (2020). The effects of new emerging technologies on Human resources, Master Thesis, University of Agder, Norway.

Chingara, R. (2022). Managing Disruptive Change through Leadership in Schools. International Journal of Social Science and Human Research. https://doi.org/10.47191/ijsshr/v5-i4-45.

Cibulskaitė, N. (2019). Paradigmatic Changes In School Heads' Attitudes Towards Leadership Functions. . https://doi.org/10.15405/epsbs.2019.01.8.

Creswell, J. W., (2019). Qualitative inquiry and research design: Choosing among five approaches (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W., (2019). Research design: qualitative, quantitative and mixed method approaches.

Creswell, J. W., (2019). Qualitative inquiry and research design: Choosing among five approaches. 3rd ed. SAGE Publications, Inc.

Deline, M. B. (2019). Framing resistance: Identifying frames that guide resistance interpretations at work. Management Communication Quarterly.

Denzin, N. K., & Lincoln, Y. S. (Eds.). (2018). The SAGE Handbook of Qualitative Research (5th ed.). Los Angeles, CA: Sage.

Dorst, P.F., Dyson, E., Handy, C., Saffo, P., and Senge, P.M. (2019). Looking ahead: Implications of the present. Harvard Business Review, 75(5), 18-27.

Elias, S.M. (2019). Employee commitment in times of change: Assessing the importance of attitude towards organizational change. Journal of Management.

Erol, B., and Tibshirani, R.J. (2020). An introduction to the bootstrap. New York : Chapman and Hall.

Fatah, A., Abdul, R., & Ismail, Nor, A., (2019). Foreign direct investment and trade openness: Do they lead to sustainable development in Malaysia? Journal of Sustainability Science and Management.

Fatah, R. (2019). Principal Leadership for Private Schools Improvement in the Industrial Revolution Era 4.0. Advances in Social Science, Education and Humanities Research.

Ferguson, L. M., (2020). Students' Involvement in Faculty Research: Ethical and Methodological Issues. International Journal of Qualitative Methods, 3(4), 56–68.

Fischetti, J. (2019). A Different Kind of Teacher for a Different Kind of School. Teacher Education in the 21st Century. https://doi.org/10.5772/INTECHOPEN.84372.

Fishbein, M., and Ajzen, I. (2020). Predicting and changing behaviour: The reasoned action approach, Psychology Press, New York.

Forsell, L. M., & Astrom, J. A. (2020). Meanings of hugging: From greeting behavior to touching implications. Com-prehensive Psychology, 1(13), 1-6. doi.org/10.2466/02.17.21.CP.1.13

Francom, G. (2020). Barriers to technology integration: A time-series survey study. Journal of Research on Technology in Education, 52, 1 - 16. https://doi.org/10.1080/15391523.2019.1679055.

Gamarra, L. (2017). Student Success through Management Competence. BU Journal of Graduate Studies in Education.

Gokee, E. (2017). The development of a scale to determine general competency for primary school teachers in Turkey: A validity and reliability study.

Gomez, C., & Rosen, B. (2021). The leader: Member exchange as a link between managerial trust and employee empowerment. Group and Organization Management.

Gray, J. R., & Burns, N. (2018). Understanding nursing research (6th ed.). W B Saunders.

Guba, E. G., (1985). Criteria for assessing the trustworthiness of naturalist iinquires: Spring US.

Guba, E.G., (1999). Fourth Generation Evaluation, Newbury Park: Sage, 1999.

Haron, H. (2020). Education in the era of IR 4.0. Keynote Speech at the 2018 International Conference on Information Management and Technology (ICIMTech 2018).

Hayes, J. (2020). The theory and practice of change management (3rd ed.), Palgrave Macmillan, New York.

Herold, G. (2020). Leadership in the Fourth Industrial Revolution. San Francisco: Stanton Chase. Retrieved from https://executiveacademy.at/fileadmin_sy nced_assets/ documents/White_Papers/Leadership-in-Fourth-Industrial-Revolution-Stanton- Chase.pdf

Holloway, I. and Galvin, K. (2020) Qualitative Research in Nursing and Healthcare.

Inan, F. A., & Lowther, D. L. (2018). Factors affecting technology integration in K-12 classrooms: A path model. Educational Technology Research and Development, 66(2), 503-525.

Kin, T. M., & Kareem, O. A. (2019). School leaders' competencies that make a difference in the era of Education 4.0: A conceptual framewor. International Journal of Academic Research in Business and Social Sciences, 9(5), 214–225.

Klap, J., MacCallum, J., & Mansfield, C. (2020). 'Head' First: Principal Self-care to Promote Teacher Resilience. Cultivating Teacher Resilience. https://doi.org/10.1007/978-981-15-5963-1_12.

Lappalainen, I, (2020). Partial least squares: Concepts, techniques and applications using SmartPLS 2.0 M3, Semarang: Diponegoro University.

Lase. (2019, August). Education and Industrial Revolution 4.0. Researchgate. Retrieved November 24, 2023, from https://www.rResearchgate.net/publication/334837153_Education_and_Industrial

Mack, et al., (2019). Qualitative Research Methods: A Data Collector's Field Guide Madsen, D.M.H. (2020), "Factors influencing Industry 4.0 adoption", Journal of Manufacturing Technology Management.

Maknun, J., Barliana, M., Rahmawati, Y., & Wahyudin, D. (2021). Teacher Competency of Vocational High School (SMK) in the Era of Industrial Revolution 4.0. , 168-171. https://doi.org/10.2991/ASSEHR.K.210203.110.

Mansor, A., Hamid, A., Medina, N., Vikaraman, S., Wahab, J., Nor, M., & Alias, B. (2020). Challenges and strategies in managing small schools: A case study in Perak, Malaysia. Educational Management Administration & Leadership, 50, 694 - 710. https://doi.org/10.1177/1741143220942517.

Menges, M., Roubanov, D. and Ernst, J. (2020). Production planning and Control (PPS), in Eigner, M., Roubanov, D., & Zafirov, R. (Eds.), Modellierte virtuelle Produktentwicklung, Springer, Berlin, 301–326.

Ministry of Education, (2020). 14 essential leadership skills for the 4th industrial revolution.

Mohammad, Valcke, M., & De Wever, B. (2019). Are they ready to teach? Student teachers'

Murphy, R. (1988). Social Closure: The Theory of Monopolization and E xclusion. New York: Oxford University Press.

Nachimuthu, K. (2019). Need of Digital-Age Literacy in Teacher Education.. Journal on School Educational Technology, 6, 1-6. https://doi.org/10.26634/JSCH.6.2.1302.

O'Flaherty, J, & Beal, E.M. (2019). Core competencies and high leverage prac tices of the Asian Journal of University Education (AJUE) Volume 18, Number 1, January 2022

79 beginning teacher: A synthesis of the literature. Journal of Education for Teaching.

Omar, A. (2021). Leadership 4.0: Digital leaders in the age of industry 4.0. International Journal of Organizational Leadership, 7(4), 404 – 412.

Oosthuizen, J. H. (2016). An assessment of 4IR intelligence of South African management practitioners through the lens of the fourth industrial revolution. Proceedings of the 10th International Business Conference.

Oreg, S. (2019). Resistance to change: Developing an individual differences measure. Journal of Applied Psychology.

Osman Uslu, A. (2019). General overview to leadership theories from a critical perspective. Marketing and Management of Innovations.

Pangandaman, H. K., Ali, N. D., Lambayong, J. H. C., & Ergas, M. L. G. (2019). Philippine higher education vis-à-vis education 4.0: A scoping review. International Journal of Advanced Research and Publications, 3(3), 65-69.

Pashiardis, P., & Johansson, O. (2021). Successful and effective schools: Bridging the gap. Educational Management Administration & Leadership.

Patton, M. (2019). Qualitative evaluation and research methods (pp. 169-186). Beverly Hills, CA: Sage.

Patton, M. Q., (2019). Qualitative Research & Evaluation Methods. 2nd edition. Sage Publications, Inc.

Patton, M. Q., (2019). Qualitative Research & Evaluation Methods. 3rd edition. Sage Publications, Inc.

Philippine Institute for Development Studies, 2019. IN FOCUS: The Fourth Industrial Revolution: What It Means for Philippine Firms.

Pillay, K., Ori, A., & Merkofer, P. (2020). Industry 4.0 is Africa ready for digital transformation?. Retrieved from https://www2.deloitte.com/content/dam/ Deloitte/za/Documents/manufacturing/za-Africa-industry-4.0-report-April14.pdf

Postholm, M. B., and J. Skrovset., (2019). "The Researcher's Role: An Ethical Dimension."

Robandi, B., Kurniati, E., & Sari, R. (2020). Profile of Educands in the Digital Era. Proceedings of the International Conference on Educational Psychology and Pedagogy - "Diversity in Education" (ICEPP 2019). https://doi.org/10.2991/assehr.k.200130.117

Rojko, A. (2019). Industry 4.0 Concept: Background and Overview. International Journal of Interactive Mobile Technologies.

S., Tyas, E. & Naibaho, L. (2021). Effective School Management in Industrial Revolution Era 4.0. Proceedings of the 2nd Annual Conference on blended learning, educational technology and Innovation (ACBLETI 2020). https://doi.org/10.2991/assehr.k.210615.042.

Sabates, D., Erkoyuncu, J., & Roy, R. (2020). A review of multi-criteria decision-making methods for enhanced maintenance delivery. Procedia CIRP, 37, 30-35.

Sagita, M., & Khairunnisa, K. (2020). E-Learning for Educators in Digital Era 4.0. , 3, 1297- 1302. https://doi.org/10.33258/birci.v3i2.974.

Sagita, M., & Khairunnisa, K. (2020). E-Learning for Educators in Digital Era 4.0. , 3, 1297- 1302. https://doi.org/10.33258/birci.v3i2.974.

Sanchez, R. & Sheene, A., (2015). Understanding competence-based management. J. Bus. Res., 57, 518–532.

Sarzoso, D., Bandoy, D., Yazon, D., Tan, C., & Buenvinida, D. (2021). Evolvi ng Roles of Outstanding School Heads in Meeting the Challenges of the New Normal: A Phenomenological Study. International Journal of Theory and Application in Elementary and Secondary School Education. https://doi.org/10.31098/ijtaese.v3i2.663.

Satoglu S., Ustundag A., Cevikcan E., Durmusoglu M.B. (2018) Lean Transformation Integrated with Industry 4.0 Implementation Methodology. In: Calisir F., Camgoz Akdag H. (eds) Industrial Engineering in the Industry 4.0 Era. Lecture Notes in Management and Industrial Engineering. Springer, Cham.

Schneider, P. (2020). Managerial challenges of Industry 4.0: An empirically backed research agenda for a nascent field. Review of Managerial Science, 12, 803–848.

Schwab, K. (2016). The Fourth Industrial Revolution. World Economic Forum

Seligman, M. E. (2011). Flourish: A visionary new understanding of happiness and well-being. Free Press.

Shenton, A. (2019). Strategies for ensuring trustworthiness in qualitative research projects. Education for Information.

Shet, R. (2019). Globalization 4.0 shaping a new global architecture in the age of the Fourth Industrial Revolution: A call for engagement. World Economic Forum Report.

Sridhar, S., & Ponniah, V.M. (2020). Ingredients for Industry 4.0 get set go! – A literature review. Journal of Xi'an University of Architecture & Technology, 12 (4), 607-613.

Streubert, H.J. & Carpenter, D.R. (2019) Qualitative Research in Nursing: Advancing the Humanistic Imperative.

Sun, S., & Peng, L. (2020). Study of the virtual reality education and digitalization in China. Journal of Physics: Conference Series, 1456. https://doi.org/10.1088/1742- 6596/1456/1/012042.

Suwarto, D., Setiawan, B., & Machmiyah, S. (2022). Developing Digital Literacy Practices in Yogyakarta Elementary Schools. Electronic Journal of e-Learning. https://doi.org/10.34190/ejel.20.2.2602.

Svensson, L., & Babaheidari, S. (2019). Exploring Barriers To The Digitalization Of Schools: A Managerial Blame-Game With Four Dimensions. Edulearn19 Proceedings. Https://Doi.Org/10.21125/Edulearn.2019.0127.

Tai, M. K., & Omar, A. K. (2021). An analysis on the implementation of professional learning communities in Malaysian secondary schools. Asian Journal of University Education.

Tai, M. K., Omar, A. K., & Khalip, M. (2021). Development of teacher competency model to meet the demands and challenges of Education 4.0. (Unpublished research report which was funded by Fundamental Research Grant Scheme [Code: FRGS/1/2019/SSI09/UPSI/02/4], Ministry of Higher Education Malaysia). Sultan Idris Education University, Perak Darul Ridzuan, Malaysia.

Tang, S.Y.F., Wong, A.K., & Cheng, M.M.H. (2019). The preparation of highly motivated and professionally competent teachers in initial teacher education. Journal of Education for Teaching.

Tomajin, J. (2022). Portrait of the Best Practices of Public School Heads in Establishing School-Community Partnerships. APJAET - Journal ay Asia Pacific Journal of Advanced Education and Technology. https://doi.org/10.54476/apjaet/30108.

UNESCO. (2020). Education in a post-COVID world: Nine ideas for public action. https://unesdoc.unesco.org/ark:/48223/pf0000373279

UNICEF. (2009). UNICEF Annual Report 2020.

Vogt, K., (2019). Assessment Literacy of Foreign Language Teachers around Europe: Research, Challenges and Future Prospects.

Willliam M. D. (2020). Industrie 4.0 - Smart manufacturing for the future. Berlin: Germany Trade & Invest.

Wilson, N. (2020). Sociotechnical and Pedagogical Barriers to Technology Integration. Wealth Creation and Poverty Reduction. https://doi.org/10.4018/978-1-5225- 0965-3.CH002.

Xing, B., & Marwala, T. (2020). Implications of the fourth industrial age on higher education. Computers and Society, Cornell University.

Yip, et al., (2019). Legal and ethical issues in research. Yusuf, B., Walters, L., & Mohamed, A. (2020). Social Media and School Leadership Efficiency. . https://doi.org/10.1093/acrefore/9780190264093.013.660.

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