Article

A Scoping Review on Digital English and Education 4.0 for Industry 4.0

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Abstract: Industry 4.0 is a current trend of automation and digitalization of industries. The impacts and importance of Industry 4.0 are reflected in all aspects of our lives. The purpose of this article is to analyze the literatures based on a scoping review method. A lack of digital culture, training, knowledge, and language are also challenges faced by Industry 4.0 while implementing its operations. Digital English and Education 4.0 are also employee competencies of Industry 4.0. The authors have reviewed the literature related to Digital English, Education 4.0, and Industry 4.0 from various resources. Astonishingly, the results show that the studies conducted in these areas are so specific focusing only one of the above-mentioned areas; no research article was identified that detailed the interconnections among these areas. From the scoping review, the study has identified the gaps in the literature. Thus, the study concludes that filling up the gaps and conducting research in these areas are useful to sort out a few of the challenges of Industry 4.0 and it recommends that in future, researchers conduct studies based on the interconnections of Digital English and Education 4.0 for Industry 4.0.

1. Introduction

Modern technological advancements like sensors, cyber-physical systems, the Internet of Things (IoT), mart networks, automations of machines, etc., influence each area of daily life. In Germany, this broad area has been introduced as Fourth Industrial Revolution, which is also known as Industry 4.0 (Kagermann et al. 2013; Shatrevich and Strautmane 2015). Since Industry 4.0 continues to change the world, new challenges arise. From a global perspective, the most important challenges while implementing Industry 4.0 are found among the employees and administrators: lack of digital culture and training, lack of clear vision or support from managers, unclear economic benefits from investments in digital technologies, high financial investment requirements (Ślusarczyk 2018) and recruiting and developing new talent, and general reluctance to change by stakeholders.

This study focuses on one of the challenges faced by Industry 4.0 that is an insufficient qualification of employees including a lack of digital culture and training. The impacts of Industry 4.0 can be seen in our day-to-day lives and are reflected in all fields (Madrak-Grochowska 2015; Wierzbicka 2018). Acquisition of technology-supported teaching and learning is increased swiftly (Markauskaite' 2003; Mashhadi and Kargozari 2011; Garavaglia et al. 2012; Chang et al. 2015; Ragulina et al. 2018). Technology-implemented upskilling in the teaching and learning process is known as Education 4.0,

which is inspired by Industry 4.0 (Anggraeni 2018). English is the most commonly preferred language in the digital era, with the application of English in the digital environment and Education 4.0; there is a considerable aftermath in Industry 4.0 and its applications.

In a special context to the taken study, it intends to highlight that English has broken the boundaries of all languages. Even non-native English speaking countries, those that until yesterday showed a lukewarm attitude to English, have begun to open their doors wide to English as an official language, such as in African nations (Plonski 2013). More than 100 countries teach English as a foreign language or second language, the list extends to China, Russia, Germany, Spain, Egypt, and Brazil (Crystal 2003). Though different nationalities speak different languages, English is accepted now as a global language (Crystal 2003; Hariharasudan et al. 2017; Dančišinová et al. 2017; Thavabalan et al. 2018). Being a lingua franca (Ananiadou et al. 2011; Hariharasudan et al. 2017), the language that is commonly preferred in the digital world is English. Applications of the Internet of Things (IoT) and digitalization of the teaching and learning process and industrial operations done through the medium of English are known as Digital English, simply saying, the electronic version of English is called as Digital English, which is widely witnessed in the multifarious functions of fourth industrial revolution. Keeping in mind that promoting Education 4.0 through Digital English is a welcoming move for achieving the fruitful results (Anggraeni 2018). Education 4.0 is introduced in many educational institutions using Digital English as a medium of instruction. It is interesting to see how digitalization helps in adding sustenance to English in Education 4.0 (Kalanzadeh et al. 2014).

With the help of digital world, and the technological innovations and advancements it has brought, day-to-day social life and lifestyles become easier than it was before. Technology provides positive impact not only on the lifestyles but also on education (Kondratiuk-Nierodzińska 2016; Zygmunt 2017; Akyuz and Yavuz 2015; Buasuwan 2018). Owing to the fast escalation of highly developed educational technologies, the traits of teaching and learning milieus have undergone considerable changes (Chang et al. 2015). As it is observed, the educational sectors are also impacted by the technology-supported teaching and learning process. Though teachers around the world still employ the chalk and board method of teaching, technical aids are also effectively employed often in smart classrooms (Jo and Lim 2015) throughout the world to sharpen the teaching and learning process. Accordingly, the terms 'digital learning' (Garavaglia et al. 2012; Akyuz and Yavuz 2015) and 'Information and Communication Technology (ICT) learning' (Gunuç and Babacan 2017; Alemi 2016; Markauskaite' 2003; Raudeliūnienė et al. 2018) have occupied a prestigious place in the education. Acquiring Digital and ICT methods of teaching and learning are effectual in accelerating students' education (Kayimbasioglu et al. 2016). Such technology-supported teaching and learning processes are the core concepts of Education 4.0. These sorts of tech-based teaching and learning experience provide self-learning opportunity at student's own pace. The Industrial Revolution 4.0 provides the advent of the digital age, and claims that educational institutions embrace an education revolution too. Education 4.0 provides the notion of teaching and learning innovation and uses information and technology in its processes (Gulicheva et al. 2017; Anggraeni 2018). As well as educational institutions individuals are considering adopting Education 4.0. In that way, there are many technology-supported teaching and learning tools available on the Internet, for instance, webinars are organized by various institutions; teaching and learning mobile apps such as Byju's—The Learning App, Toppr, Khan Academy: Free Learning App, and Math Tricks; Educational contents are increasingly presented in the YouTube Channels for better learning (Bateman and Schmidt-Borcherding 2018); online courses are conducted by Coursera, NPTEL, etc.

To the best of our knowledge, there is no such research conducted with the interconnections of Digital English and Education 4.0 for Industry 4.0, only specific studies have been carried out that focus on only one of the above mentioned contexts. In a worldwide content, one of the most common and important challenges while implementing Industry 4.0 is a lack of digital culture, training, and knowledge (Ślusarczyk 2018). The acquisitions of Digital English and Education 4.0 help users to adapt to the digital world; it is very useful to implement the Industry 4.0 without any primary hurdles.

This review paper aims to investigate the scope and the progress of Digital English and Education 4.0 for Industry 4.0. The authors also focus and review the impact and importance of Digital English and Education 4.0 for Industry 4.0; the studies related to these fields tend to provide some interesting afterthoughts of Digital English and Education 4.0 for Industry 4.0 for the upcoming years. The objective of this study is to review the selected areas using the Scoping Review method and also to motivate similar new zone researches in future.

The rest of the paper is organized as Sections 2–8. Each section deals with separate subject matter. Section 2 discusses methodology, which adopts a Scoping Review approach and reviewed the literatures in back-and-forth method. Section 3 deals with the interconnections of Digital English and Education 4.0, from the literature it is identified that Digital English and Education 4.0 are connected. Section 4 reveals the importance of Digital English in one of the applications of Industry 4.0, which is IoT. Section 5 opens the gateway to Industry 4.0: Education 4.0. Section 6 describes the justification of identified research gaps from the reviewed literatures. Section 7 contains the results and subsequent discussion, and finally, Section 8 presents the conclusions of the study.

2. Methodology

The methodology of this study adopts a Scoping Review, which is not a linear process (as typically dictated by the protocol for a systematic review) but a back-and-forth between early finds and new insights, and changes in search terms and even questions (Arksey and O'Malley 2005). The purpose of the scoping review is to find all the materials on the topic without any restrictions on the materials resourced. Considering this approach, the study has analyzed and reviewed the literatures related to digital English, Education 4.0, and Industry 4.0.

Figure 1 shows the distribution of literatures that have been conducted using the Scoping Review method. The descriptions and reviews are carried out by analyzing the studies related to Digital English, Education 4.0, and Industry 4.0. While analyzing the studies carefully, it is startling that the authors have come across four interesting facts. Firstly, the authors have identified the mutual interdependence between Digital English and Education 4.0 by analyzing the various studies. It emphasizes that Digital English and Education 4.0 are interconnected and mutually depend upon each other. Secondly, the impacts and importance of Digital English are identified in one of the applications of Industry 4.0, IoT. IoT is the most important and emerging field in the digital era; this study highlights the fact that a lack of research has been conducted on the impacts and importance of Digital English in IoT. Thirdly, the study shows the importance of Education 4.0, which is an opener to the fourth industrial revolution. Inadequate knowledge or training is one of the most important challenges faced by Industry 4.0, which is highlighted by the authors through the cited studies. It also states that Education 4.0 or digital education helps learners get ready for the digital world. Lastly, this study traces the evidences from the previous studies on Digital English, Education 4.0, and Industry 4.0 and also finds the interconnections among these areas. Interestingly, the study finds the gaps in research and motivates new researches related to the scope and emphasizes the impacts and importance of Digital English and Education 4.0, which are the key factor for Industry 4.0.
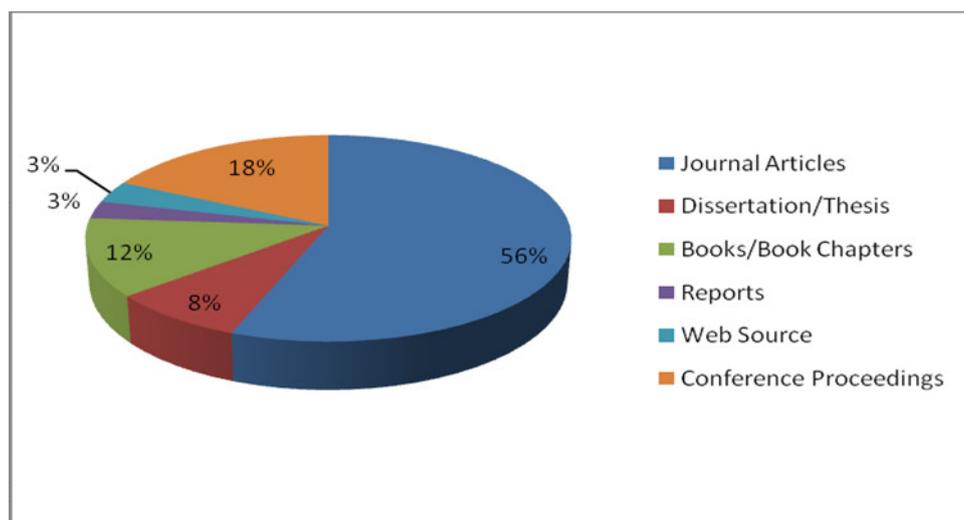
Figure 1. Distribution of scoping reviewed literature.

3. Interconnections of Digital English and Education 4.0

As mentioned, English is the medium of the digital world, and without doubt Education 4.0 is also adopted through instructive language, Digital English (Vanorsdale 2017; Hockly 2014; Azim and Rahman 2014). There are many technology supported teaching and learning tools available in the digital world, and most of them are accessed by the learners for self-directed learning. Interestingly, the preferred language to access those tools is English, to compete globally, as it is the most preferred language for education.

Inversely, learning English as a second and foreign language of non-native English speakers is difuclt. Technology integrated method (Education 4.0) is used to support the acquisition of English language teaching and learning as an easier method (Alemi 2016; Šafranj 2013; Martins 2015). So, Digital English in Education 4.0 and Education 4.0 in English Learning function vice versa. The study result of Golonka et al. reveals that learners enjoy using technology in foreign language learning and they wish to use technology more than the usual materials and methods. Technology enables them to be more engaged in the progression of learning, and they tend to take a more optimistic approach towards education (Golonka et al. 2014). Lan et al. conducted a collaborative study on peer-assisted learning practices of elementary school EFL (English as a Foreign Language) learners in Taiwan in small reading groups, with and without tablet PCs (Lan et al. 2007). Mobile devices are the most used ICT methods in the digital world (Allabouche et al. 2016). The tablet PC group uses communication software, Skype, and the non-tablet group does not have access to computers. The result of the study shows that tablet PC group pays more attention to the reading tasks, and demonstrates more collaborative behaviors like giving support and feedback and avoiding conflicts, in contrast the non-tablet PC group shows poor progression. The study of Artyushina and Sheypak also reveals that mobile phones help to develop the listening skills of English and improves the abilities of students' communicative practice (Artyushina and Sheypak 2018). Thus, technology integrated (Education 4.0) English language learning gives commendable growth (Lan et al. 2007). The investigative study was conducted among Thai English language teachers to get to know the effectiveness of English writing and learning through Facebook. The study result reveals that Facebook has an optimistic effect on Thai English teachers' English writing skills and learning endeavors and also suggests that Facebook can be a useful method and recommended platform for English learning. The study also recommends that this tool is not only for English teachers but also to the individual learners or the teachers of other fields (Sirivedin et al. 2018). Consequently, Digital English and Education 4.0 are interlinked, and it cannot be separated as it is needed globally; both depend on each other for sustainable growth.

4. The Importance of Digital English

English is not only considered as the language of communication, business, and academia but also the language of the Internet. Uses of the Internet accelerate the speed of globalization. The medium and electronic version of English in the digital environment is known as Digital English. Mostly, Digital English and Internet are inseparable. Though many languages are used in a number of websites, English is preferred by the largest group of Internet users, and dominates web content (Flammia and Saunders 2007). The dominance of Digital English in websites makes English as the language on Internet. Most of them consider that Digital English is the primary language of the World Wide Web for a long time, and the most commonly preferred search engines are designed in English only. The following data highlights the number of Internet users in English of the world.

Table 1 shows the top ten languages in the Internet. While comparing it with other languages, English stands at the top of languages used on the Internet. Though the population of China is closer to the English counterpart, the users of internet in English is considerably higher and their percentage is 25.3% whereas Chinese users' percentage is 19.4% and the number of people who use Chinese as their Internet language is lower compared with English. It also shows that with the exception of Chinese, the non-English speaking population is very low and they are not competing with English language in any way. Other than the numbers in table, it is evident that most of the non-English speaking people also prefer to use English in their day-to-day activities and Internet (Hodžić 2013; Crystal 2003; Zikmundová 2016).

Table 1. Top ten languages on the Internet.

Top Ten Languages in the Internet	World Population for this Language	Internet Users by Language	Internet Penetration	Internet Users% of World
English	1,462,008,909	1,052,764,386	72.0%	25.3%
Chinese	1,452,593,223	804,634,814	55.4%	19.4%
Spanish	515,759,912	337,892,295	65.5%	8.1%
Arabic	435,636,462	219,041,264	50.3%	5.3%
Portuguese	286,455,543	169,157,589	59.1%	4.1%
Indonesian/Malaysian	299,271,514	168,755,091	56.4%	4.1%
French	127,185,332	118,626,672	93.3%	2.9%
Japanese	143,964,709	109,552,842	76.1%	2.7%
Russian	405,644,599	108,014,564	26.6%	2.8%
German	94,943,848	84,700,419	89.2%	2.2%
Top 10 Languages	5,135,270,101	3,206,613,856	62.4%	77.1%
Rest of the Languages	2,499,488,327	950,318,284	38.0%	22.9%
World Total	7,634,758,428	4,156,932,140	54.4%	100.0%

Source: Internet World Stats (2017).

The application of the Internet extends to all the fields. The Internet is a crucial tool in the modern era. The soul of the Internet of Things (IoT) is Internet (Vermesan and Friess 2013). IoT expands the interdependence of humans. It is one of the most important functions of Industry 4.0. In this digital world, IoT occupies a significant place in human life equal to our shadows. The everyday life of mankind cannot have mobility without IoT: a vehicle cannot move without its wheels. It allows people around the world to connect on a peer-to-peer basis (Draishpits 2016). The result is that new ideas, new concepts and new meanings have taken hold much rapidly. The industrial applications of IoT operates in a vast arena such as, Consumer Applications, Smart Home, Enterprise Applications, Infrastructure Applications, Manufacturing, Agriculture, Energy Management, Environmental Monitoring, Building and Home Automation, Metropolitan Scale Deployments, Medical And Healthcare, Elder Care, and Transportation.

Predominantly, English has been used in all the above IoT applications as the medium of operation since English is used as the lingua franca of the digital world. Digital English is constantly adapting, but these alterations have appeared more quickly as technology is growing rapidly in modern

times. As human beings, we build up our own methods to state new things as well as adapting to different types of communications. As the digital age has transformed the way we communicate, it has also influenced the way we employ language. Thus, English is used digitally and it helps to instruct and implement an online communication strategy in the Industrial applications of IoT. It is clearly visible in the programming languages of IoT too. The top six programming languages of IoT are C, Java, Python, JavaScript, Swift, and PHP and the instructive keywords employed in those software programs are also in English. However, many studies are available which relate to the uses and benefits of IoT (Talari et al. 2017), technology integration in English language teaching and learning (Gunuç and Babacan 2017; Solanki 2012; Kalanzadeh et al. 2014), Digital English in Internet (Flammia and Saunders 2007), and to the best of our knowledge, no such research has been conducted on the use and need of digital English in IoT or Industry 4.0.

5. Education 4.0 is a Gateway to the Fourth Industrial Revolution

The technology-based teaching and learning method is known as Education 4.0, which is inspired by Industry 4.0. Education 4.0 aims to improve the digital technological competences across all levels, and to enhance the use of digital technologies for teaching and learning. The approach functions on four ways: basic digital education for all pupils and students, digitally competent educators, learners and employees, and digital educational media. Education 4.0 provides for the needs of society in the innovative era. It is in accordance to the changing behavior with the special characteristics of parallelism, connectivism (Goldie 2016), and visualization. This education must help to widen learners' or new employees' competencies to apply the new technology, which will help the learners or new employees to develop in relation to the changes in society. Education 4.0 allows the learners to grow with knowledge and skills for their entire life, not just to know how to read and write which enables individuals to be able to live in a society and be equipped with the best of his/her competencies. Therefore, Education 4.0 provides more than just education.

In the digital world of fast changing technology and information overload, students need to be trained and not taught, simply saying, students must be technically competent for today's Industrial operations. Information needs to be made accessible and students need to learn how to find it rather than the teacher offering it to them in a rigid structure. It is now understood that students are not alike, do not have the same starting point, can learn and absorb different areas of focus differently, and need to be guided to develop their skills rather than taught a set of predefined points. Education 4.0 needs to make parallel with Industry 4.0 and get ready students for the next industrial revolution, which will happen in their lifetime. Students will experience while 'Learning by Doing'. They will have many opportunities to learn how to apply their skills in a variety of situations. They will get adequate project-based learning which equally helps them to learn about organizational, collaborative, and time management skills. Education 4.0 makes the students to adopt real-world skills that are representative of their jobs. This means that the curriculum will be designed in such a way that it creates more room for students to fulfill internships, monitoring projects, and work on project-based activities. Students will get an opportunity to build logical mindsets. The interesting part is that they will have statistical analysis, analyses data, and predict future trends, applying their theoretical knowledge into numbers and reasoning. Education 4.0 changes the traditional ways of taking exams. Students are not examined for their memorization capacity. They are tested in real-time according to their performance when they work on projects in the field. Thus, these factors not only give technical competencies to the students but also to the future employees of Industry 4.0.

The fourth industrial revolution (Industry 4.0) makes unimaginable and rapid changes in all the fields (Prause and Atari 2017), which are reflected in agriculture, health care, business, education, and so on. Industry 4.0 is marked by rising technology penetrates in a number of fields, including artificial intelligence, autonomous vehicles, quantum computing, biotechnology, Smart Home, The Internet of Things (IoT), robotics, 3D printing, and nanotechnology. There are also remarkable technology integrated changes in education, known as Education 4.0, which is

inspired by Industry 4.0. This digital world has upgraded the interdependences of teaching and learning processes, which also confront the same changes in education and one has to undergo the necessary adaptations to implement and overcome the challenges of Industry 4.0 (Smolag and Kot 2015). There are many challenges while implementing Industry 4.0, among them, insufficient qualification of employees and lack of adequate skill-sets to expedite the march towards fourth industrial revolution (Karagözoğlu 2017; Ciobanu and Androniceanu 2018) are issues that need to be addressed. In the recent decades, Information and Communication Technologies (ICT) have entered into every single area of the industry (Raišienė and Jonušauskas 2013; Delina and Tkáč 2015; Smolag and Kot 2015; Madan et al. 2016; Bartosik-Purgat et al. 2017). In this case, the technology integration in education definitely speeds the progress of Industry 4.0. Inventiveness and reducing physical work are the cornerstones of Industry 4.0 (Prause 2016). It absorbs utilizing the automation to practice youngsters for challenges that they may face at their workplaces (Androniceanu 2017). Therefore, there occurs a need for Education 4.0, one that put emphasis on the need to focus on mentoring students to take challenges head-on. Incidentally, some of the principles of Education 4.0 (ICT and IoT) are parallel to Industry 4.0 (Wallner and Wagner 2016; Artyushina and Sheypak 2018; Išoraitė 2014). The study of Smolag and Kot also reveals the same; it states that E-learning provides future engineers a chance to obtain capabilities that play an important role in the present economic conditions (Smolag and Kot 2015). In order to be unbeaten in the venture to prepare the trainers or students or learners for the digital world, it is suggested that Education 4.0 is known best for its life coping skills of 21st century such as leadership, collaboration, creative, digital literacy, effective communication, emotional intelligence, entrepreneurship, global citizen, problem-solving and teamwork, critical thinking, creativity and innovation, cross-cultural understanding, information and media literacy, and career and learning skills (Puncreobutr 2016; Krpálek and Krelová 2016).

One of the most important methods of Education 4.0 is digital learning, which is an effective teaching method to enhance students' learning experience (Daud et al. 2015). The results of Daud et al. agree that digital learning practices can improve the quality of students' learning that can be understood by the following table, which emphasizes the interests of the participants' Digital learning practices.

Table 2 shows the mean ranged from 3.85 to 4.22. Based on the results, the highest mean value is 4.22; most of the respondents believe that by using mobile phones, learning sessions will be made easier. Item 8 shows that most of the respondents agree that digital learning practices can improve the quality of their learning.

Table 2. Perception of self-motivation.

No	Self-Motivation	Mean	SD
1.	Like learning to use the D-Learning	3.99	0.81
2.	D-Learning accordance with my learning style	3.99	0.83
3.	D-Learning can improve the quality of my learning	4.07	0.77
4.	Be more productive by using D-Learning	3.99	0.75
5.	Getting encouragement from friends to use the D-Learning	3.99	0.83
6.	Got a boost from lecturer to use the D-Learning	4.11	0.84
7.	Sure will do a good job when using the D-Learning	4.20	0.77
8.	Can solve the problem in the learning process by using the D-Learning	4.06	0.87
9.	Many use the higher mental capacity when using the D-Learning	3.85	0.98
10.	Feel more comfortable when learning using mobile devices	4.17	0.80
11.	Using the D-Learning to change my learning style	4.15	0.81
12.	Believes using mobile devices, learning sessions will be easier	4.22	0.79

Source: Data obtained from the study of Daud et al. (2015).

The study of Mashhadi et al. reveals that Education 4.0 (Digital Classrooms) is a vital tool while also promoting and improving the traditional methods of teaching and learning. It improves the quality of education by increasing the interaction between teacher and learners worldwide. Their study also states that digital learning makes the flexible hours for knowledge acquisition like after the regular

class hours (Mashhadi and Kargozari 2011). Anggraeni conducted a study on promoting Education 4.0 in English in a survival class. Three challenges have revealed while promoting Education 4.0: focusing on the lecturers' teaching techniques, students' speaking skill, and facilities. In addition, the lecturers and students need to highlight those challenges and solve those problems (Anggraeni 2018). Thus, many studies have been conducted to assess the importance of Education 4.0, but up to our knowledge and considering the literature, the researchers come to the conclusion that there is no such research conducted by stating as Education 4.0 is a key to Industry 4.0.

6. Identified Gaps and Justifications

A careful description is made by analyzing the studies conducted in the field, such as Digital English, Education 4.0, and Industry 4.0. The authors' major intention is neither finding the research gaps nor highlighting those gaps, in other words the study does not focus only on finding the gaps instead the study focuses on reviewing the available literatures. However, it is astonishing that the studies conducted in these areas are so specific, focusing on only one of the above-mentioned contexts; no research has been identified on analyzing or stating the interconnections among these areas. Due to increased demands and growth in automation of industries, many would agree that a more complete body of research is needed in the area of Digital English and Education 4.0 for Industry 4.0. Even though more studies have been undertaken in these areas over the past few years, those studies are so specific and not interrelated; there are still gaps in the available literature. Thus, the research gaps are identified by the authors as follow:

From the studies, it is evident that the studies have been conducted among Education 4.0 and English language learning and also both of them are interconnected and usefully implemented in many places. However, there is a gap in the application and effective role of Education 4.0 in other subjects too. This gap must be resolved for the fullest learning experience. Though English is used as the medium of all correspondence of globalized digital world, no research has been conducted focusing on the needs of Digital English in one of the applications of Industry 4.0, Internet of Things (IoT). IoT is rapidly emerging in all walks of our life and most of them can benefit through its application. It reduces the physical efforts and helps in interdependent functions. However, Digital English is the commonly preferred language of IoTs' applications. Though many applications use Digital English in IoT or Industry 4.0, according to us, and based on the literature reviewed, there has been no such research carried out to find out the impacts and importance of Digital English in Industry 4.0. There is a need in the research, which has to be conducted to know the impacts and importance of Digital English in the application of Industry 4.0, such as instruction, operation, guidelines, interactions etc. Resolving the gap in this area will motivate employees, business people, and corporate companies in order to know the impacts and importance of Digital English and to successfully implement the Industry 4.0. It is clear that the lack of training or knowledge is one of the most tangible challenges while implementing the Industry 4.0. The learners, who prefer to learn through the digital environment—Information and Communication Technology (ICT) method, online learning, or any other methods of Education 4.0—will face Industry 4.0 without any difficulties. However, none of the studies has been done in this regard. So, the gap has to be filled up by conducting research on Education 4.0 for Industry 4.0. The challenges of Industry 4.0 must be overcome because in the near future most the operations will be done through automation. So, the sufficient knowledge or digital learning of the industrial operations prior to the employment or during the employment may motivate the learners positively.

7. Results and Discussions

The study has identified three results (gaps) after a careful analysis of previously conducted studies related to the fields of Digital English, Education 4.0, and Industry 4.0. At first, there is a vibrant interconnection between Digital English and Education 4.0 and both are mutually interdependent and adopted in many countries to augment individual and institutional growth. The below listed findings

of other studies are correlated with the results of this study. The findings of Solanki, Gunuç, and Parrilla draw similar conclusions and conclude that adopting Education 4.0 (technology supported method) develops English learning skills and is more student-centered and less time consuming (Mashhadi and Kargozari 2011; Solanki 2012; Parrilla 2016; Gunuç and Babacan 2017). Simultaneously, the study results of Flammia conclude that the most preferred language for digital literacy is English and it is also implemented in many institutions (Flammia and Saunders 2007). Thus, Digital English and Education 4.0 are interlinked in many places. However, the study also suggests for conducting research on the application of Education 4.0 in other subjects too. Secondly, it is identified that Digital English is in the wish list of Internet of Things (IoT) users and most IoT operations are developed by English only. Digital English is a medium of IoT in both levels as programming language and instructive language; it is visible while coming across IoT applications. However, no such research has been conducted by analyzing the impacts and importance of Digital English in IoT or any other Industry 4.0 operation. So, the authentication of the result of the study will nurture the habits of inculcating to conduct research on Digital English in IoT or any of the applications of fourth industrial revolution. Thirdly, it is understood from the study of Ślusarczyk that one of the challenges of Industry 4.0 is a lack of training or knowledge (Ślusarczyk 2018). In her study, almost half of the respondents have indicated a negative response, which is a lack of training or knowledge in Africa and lack of properly qualified staff in Germany (Ślusarczyk 2018). From the context of Thailand 4.0, the study findings of Buasuwan reveal that new mindset and skillset of lecturers and students, and new technology of learning are needed for a fruitful implementation of Thailand 4.0 (Buasuwan 2018). One of the suggestions of Wallner and Wagner reveals that the future will be a full of automation of industries. If the students need to integrate with the Industry 4.0, they have to adopt prerequisite—Education 4.0 (Wallner and Wagner 2016). From the reviewed studies, it is evident that education 4.0 is the best way to implement the Industry 4.0 successfully without any primary hurdles. The study shows that no such research has been carried out by analyzing the impacts and importance of Education 4.0 for Industry 4.0. So, enough discussions have been revealed from the results of the study for conducting future research to fill up the gaps in these areas.

8. Conclusions

The study is based on the scoping review method. By adopting this literature review, the results and detailed discussions of the current research available on the topic of Digital English and Education 4.0 for Industry 4.0 show the following research gaps, (1) Application of Education 4.0 in other subjects rather than English, (2) Impacts and Importance of Digital English in Industry 4.0, and (3) Education 4.0 is a gateway to Industry 4.0. Filling up the gaps and conducting researches in these areas are useful to sort out a few challenges of Industry 4.0. From the reviewed literature, it is concluded that although most of the studies have been conducted in the areas of Digital English, Education 4.0, and Industry 4.0, each area is unique in its nature but not interconnected with other areas. There are many research opportunities exist within these gaps but it is startling that still, the lacks of such research are available. It cannot be assumed that why these gaps exist. Why the interdependent or interconnective research is not conducted by experts in the fields of Digital English, Education 4.0, and Industry 4.0? Have the opportunities to conduct research in these areas not been available? How to conduct interconnective research in these areas? These may be addressed in a future study and the answers to the above questions may be considered a limitation to this study. In the horizon of technology, the world is upgrading day-by-day, and automation in every filed is a welcome one. Therefore, here are some recommendations to ensure that future researches have to be conducted with the interconnections of Digital English and Education 4.0 for Industry 4.0. There is a need to conduct future research in this area, which will enlighten the real scenario of the fourth industrial revolution and its one of the challenges of a lack of digital culture, training and knowledge.

References

Akyuz, Serhat, and Fatih Yavuz. 2015. Digital Learning in EFL Classrooms. *Procedia–Social and Behavioral Sciences* 197: 766–69. [CrossRef]

Alemi, Minoo. 2016. General Impacts of Integrating Advanced and Modern Technologies on Teaching English as a Foreign Language. *International Journal on Integrating Technology in Education* 5: 13–26. [CrossRef]

Allabouche, Kaoutar, Omar Diouri, Ahmed Gaga, and Najiba El Amrani El Idrissi. 2016. Mobile Phones' Social Impacts on Sustainable Human Development: Case Studies, Morocco and Italy. *Entrepreneurship and Sustainability Issues* 4: 64–73. [CrossRef]

Ananiadou, Sophia, John McNaught, and Paul Thompson. 2011. *The English Language in the Digital Age*. Germany: Springer, pp. 1–43.

Androniceanu, Armenia. 2017. The three-dimensional approach of Total Quality Management, an essential strategic option for business excellence. *Amfiteatru Economic* 19: 61–78.

Anggraeni, Candradewi Wahyu. 2018. Promoting Education 4.0 in English for Survival Class: What are the Challenges? *Metathesis-Journal of English Language, Literature, and Teaching* 2: 12–24. [CrossRef]

Arksey, Hilary, and Lisa O'Malley. 2005. Scoping Studies: Towards a Methodological Framework. *International Journal of Social Research Methodology: Theory and Practice* 8: 19–32. [CrossRef]

Artyushina, Galina, and Olga A. Sheypak. 2018. Mobile Phones Help Develop Listening Skills. *Informatics* 5: 1–7. [CrossRef]

Azim, Farhan, and Mir Md Saifur Rahman. 2014. Mobile Embedded Self-study Materials for CPD: The Use of English Language for Teachers (EL4T) in Bangladesh. In *Innovation in English Language Teacher Education*. Edited by George Pickering and Professor Paul Gunashekar. New Delhi: British Council, pp. 79–86. ISBN 978-0-86355-765-1.

Bartosik-Purgat, Małgorzata, Nela Filimon, and Meltem Kiygi-Calli. 2017. Social Media and Higher Education—An International Perspective. *Economics and Sociology* 10: 181–91. [CrossRef] [PubMed]

Bateman, John A., and Florian Schmidt-Borcherding. 2018. The Communicative Effectiveness of Education Videos: Towards an Empirically-Motivated Multimodal Account. *Multimodal Technologies and Interaction* 2: 1–27. [CrossRef]

Buasuwan, Prompilai. 2018. Rethinking Thai higher education for Thailand 4.0. *Asian Education and Development Studies* 7: 157–73. [CrossRef]

Chang, Hsin-Yi, Chia-Yu Wang, Min-Hsien Lee, Hsin-Kai Wu, Jyh-Chong Liang, Silvi W. Y. Lee, Guo-Li Chiou, Hao-Chang Lo, Jing-Wen Lin, Chung-Yuan Hsu, and et al. 2015. A Review of Features of Technology-Supported Learning Environments based on Participants' Perceptions. *Computers in Human Behavior* 53: 223–37. [CrossRef]

Ciobanu, Alina, and Armenia Androniceanu. 2018. Integrated human resources activities—The solution for performance improvement in Romanian public sector institutions, Management Research and Practice 10: 60–79. 10: 60–79.

Crystal, David. 2003. *English as a Global Language*. Cambridge: Cambridge University Press, pp. 1–212. ISBN 9780511078620.

Dančišinová, Lucia, Eva Benková, and Zuzana Daňková. 2017. Presentation Skills as Important Managerial Competences in the Context of Professional Communication. *Polish Journal of Management Studies* 15: 37–46. [CrossRef]

Daud, Rafizah, Zarulrizam Ab. Jalil, and M. Gunawan M. Noor Fathoni. 2015. Community College Students' Perception towards Digital Learning in Malaysia. *Procedia—Social and Behavioral Sciences* 195: 1798–802. [CrossRef]

Delina, Radoslav, and Michal Tkáč. 2015. Role of E-Business in the Perception of ICT Impact on Revenue Growth. *Journal of Business Economics and Management* 16: 1140–53. [CrossRef]

Draishpits, Gary. 2016. Peer-to-Peer Communication in Wireless Networks as an Alternative to Internet Access. Master's thesis, The Open University of Israel, Ra'anana, Israel.

Flammia, Madelyn, and Carol Saunders. 2007. Language as Power on the Internet. *Journal of the American Society for Information Science and Technology* 58: 1899–903. [CrossRef]

Garavaglia, Andrea, Valentina Garzia, and Livia Petti. 2012. Quality of the Learning Environment in Digital Classrooms: An Italian Case Study. *Procedia—Social and Behavioral Sciences* 46: 1735–39. [CrossRef]

Goldie, John G. S. 2016. Connectivism: A Knowledge Learning Theory for the Digital Age? *Medical Teacher* 38: 1064–69. [CrossRef] [PubMed]

Golonka, Ewa M., Anita R. Bowles, Victor M. Frank, Dorna L. Richardson, and Suzanne Freynik. 2014. Technologies for Foreign Language Learning: A Review of Technology Types and Their Electiveness. *Computer Assisted Language Learning* 2: 70–105. [CrossRef]

Gulicheva, Elena, Evgeny Lisin, Marina Osipova, and Asset Khabdullin. 2017. Leading factors in the formation of innovative education environment. *Journal of International Studies* 10: 129–37. [CrossRef] [PubMed]

Gunuç, Selim, and Nuri Babacan. 2017. Technology Integration in English Language Teaching And Learning. *The Journal of Teaching English for Specific and Academic Purposes* 5: 349–58.

Hariharasudan, A., S. Robert Gnanamony, and S. Rajaram. 2017. An Eye View of Technical English Language among Engineering Students in Southern Tamil Nadu (India): An Analysis in the Postmodern Era. *Global Journal of Business and Social Science Review* 5: 9–17.

Hockly, Nicky. 2014. Digital Literacies. In *Innovation in English Language Teacher Education*. Edited by George Pickering and Professor Paul Gunashekar. New Delhi: British Council, pp. 232–36. ISBN 978-0-86355-765-1.

Hodžić, Alma. 2013. Advertisements in English in a Non-English Speaking Country. Bachelor's thesis, Linnaeus University, Växjö, Sweden.

Internet World Stats. 2017. Internet World Users by Language Top 10 Languages. Available online: www.internetworldstats.com/stats7.htm (accessed on 23 August 2018).

Išoraitė, Margarita. 2014. ICT and Entrepreneurship: Social Network Marketing. *Entrepreneurship and Sustainability Issues* 2: 19–29. [CrossRef]

Jo, Jaechoon, and Heuiseok Lim. 2015. A Study on Effectiveness of Smart Classrooms through Interaction Analysis. *Advanced Science Letters* 21: 557–61. [CrossRef]

Kagermann, Henning, Wolfgang Wahlster, and Johannes Helbig. 2013. *Securing the Future of German Manufacturing Industry: Recommendations for Implementing the Strategic Initiative Industrie 4.0. Final Report of the Industrie 4.0 Working Group*. Munich: Acatech—National Academy of Science and Engineering.

Kalanzadeh, Gholam Ali, Hassan Soleimani, and Morteza Bakhtiarvand. 2014. Exploring the Influence of Using Technology on Iranian EFL Students' Motivation. *Procedia—Social and Behavioral Sciences* 98: 814–23. [CrossRef]

Karagözoğlu, Bahattin. 2017. Technology and Its Aftermath. In *Science and Technology from Global and Historical Perspectives*. Cham: Springer, pp. 205–25. ISBN 3319528890.

Kayimbasioglu, Dervis, Bora Oktekin, and Huseyin Haci. 2016. Integration of Gamification Technology in Education. *Procedia Computer Science* 102: 668–76. [CrossRef]

Kondratiuk-Nierodzińska, Monika. 2016. New Knowledge Generation Capabilities and Economic Performance of Polish Regions. *Equilibrium. Quarterly Journal of Economics and Economic Policy* 11: 451–71. [CrossRef]

Krpálek, Pavel, and Katarína Krpálková Krelová. 2016. Possibilities for Developing Business Potential in Economic Education. Examples of Implementation in Slovakia and the Czech Republic. *Economics and Sociology* 9: 119–33. [CrossRef]

Lan, Karey Yuju, Yao-Ting Sung, and Kuo EN Chang. 2007. A Mobile Device Supported Peer Assisted Learning System for Collaborative Early EFL Reading. *Language Learning and Technology* 11: 130–51.

Madan, Pankaj, Vinay Sharma, and Piyush Seth. 2016. Capability Development through ICT Enabled Business Opportunity Development Model of E-Choupal. *Journal of Business Economics and Management* 17: 314–30. [CrossRef]

Madrak-Grochowska, Małgorzata. 2015. The Knowledge-based Economy as a Stage in the Development of the Economy. *Oeconomia Copernicana* 6: 7–21. [CrossRef]

Markauskaite', Lina. 2003. Critical Review of Research Findings on Information Technology in Education. *Informatics in Education* 2: 65–78.

Martins, Maria de Lurdes. 2015. How to Effectively Integrate Technology in the Foreign Language Classroom for Learning and Collaboration. *Procedia—Social and Behavioral Sciences* 174: 77–84. [CrossRef]

Mashhadi, Vahideh Zolfaghari, and Mohammad Reza Kargozari. 2011. Influences of Digital Classrooms on Education. *Procedia Computer Science* 3: 1178–83. [CrossRef]

Parrilla, Larissa Karina. 2016. Multimedia Technologies' Influence on Language Acquisition in English Language Learner. Doctoral's thesis, Walden University, Minneapolis, MN, USA.

Plonski, Patrick. 2013. Why Are More African Countries Adopting English as an Official Language? Paper presented at the African Studies Association Annual Conference, Baltimore, MD, USA, November 23.

Prause, Gunnar. 2016. E-Residency: A Business Platform for Industry 4.0? *Entrepreneurship and Sustainability Issues* 3: 216–27. [CrossRef]

Prause, Gunnar, and Sina Atari. 2017. 0n Sustainable Production Networks for Industry 4.0. *Entrepreneurship and Sustainability Issues* 4: 421–31. [CrossRef]

Puncreobutr, Vichian. 2016. Education 4.0: New Challenge of Learning. *St. Theresa Journal of Humanities and Social Sciences* 2: 92–97.

Ragulina, Yulia V., Elena I. Semenova, Irina A. Zueva, Elena V. Kletskova, and Elena N. Belkina. 2018. Perspectives of solving the problems of regional development with the help of new internet technologies. *Entrepreneurship and Sustainability Issues* 5: 890–98. [CrossRef]

Raišienė, Agota Giedrė, and Steponas Jonušauskas. 2013. Silent Issues of ICT Era: Impact of Techno-stress to the Work and Life Balance of Employees. *Entrepreneurship and Sustainability Issues* 1: 108–15. [CrossRef]

Raudeliūnienė, Jurgita, Vida Davidavičienė, and Arturas Jakubavičius. 2018. Knowledge management process model. *Entrepreneurship and Sustainability Issues* 5: 542–54. [CrossRef]

Šafranj, Jelisaveta. 2013. Using Information Technology in English Language Learning Procedure: Blended Learning. *Procedia—Social and Behavioral Sciences* 83: 514–21. [CrossRef]

Shatrevich, Vladimir, and Valentina Strautmane. 2015. Industrialisation Factors in Post-industrial Society. *Entrepreneurship and Sustainability Issues* 3: 157–72. [CrossRef]

Sirivedin, Phiyapa, Weerachat Soopunyo, Sunti Srisuantang, and Achara Wongsothorn. 2018. Effects of Facebook Usage on English Learning Behavior of Thai English Teachers. *Kasetsart Journal of Social Sciences* 39: 183–89. [CrossRef]

Ślusarczyk, Beata. 2018. Industry 4.0—Are We Ready? *Polish Journal of Management Studies* 17: 232–48.

Smoląg, Klaudia, and Sebastian Kot. 2015. Contemporary Conditions of Engineers Education Process Management. *Polish Journal of Management Studies* 11: 149–59.

Solanki, D. Shyamlee. 2012. Use of Technology in English Language Teaching and Learning: An Analysis. *International Proceedings of Economics Development and Research* 33: 150–56.

Talari, Saber, Miadreza Shafie-khah, Pierluig Siano, Vincenzo Loia, Aurelio Tommasetti, and João P. S. Catalão. 2017. A Review of Smart Cities Based on the Internet of Things Concept. *Energies* 10: 1–23. [CrossRef]

Thavabalan, P., A. Hariharasudan, and S. Mohan. 2018. Business English Communication of Garments Industries in Tirupur, India: A Statistical Analysis. *International Journal of Pure and Applied Mathematics* 119: 13855–60.

Vanorsdale, Christie. 2017. Communicative Language Teaching in E-Learning: How Confident are the Instructors? Paper presented at the E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, Vancouver, BC, Canada, October 17; pp. 489–93.

Vermesan, Ovidiu, and Peter Friess. 2013. *Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems*. Denmark: River Publishers, ISBN 978-87-92982-96-4.

Wallner, Thomas, and Gerold Wagner. 2016. Academic Education 4.0. Paper presented at the International Conference on Education and New Developments, Ljubljana, Slovenia, June 12–14; pp. 155–59.

Wierzbicka, Wioletta. 2018. Information Infrastructure as a Pillar of the Knowledge-based Economy—An Analysis of Regional Differentiation in Poland. Equilibrium. *Quarterly Journal of Economics and Economic Policy* 13: 123–39.

Zikmundová, Eva. 2016. English as a Lingua Franca: Theory and Practical Implication. Bachelor's thesis, University of West Bohemia, Plzeň, Czech Republic.

Zygmunt, Aleksandra. 2017. Innovation Activities of Polish Firms. Multivariate Analysis of the Moderate Innovator Countries. *Oeconomia Copernicana* 8: 505–21. [CrossRef]