The Usage of AI Robot in English Language Teaching for City Revitalization
Case Study: Toda Daini Elementary School, Toda City, Saitama, Japan

Althaf Gauhar Auliawan¹, Susy Ong²
School of Strategic and Global Studies, Universitas Indonesia, Depok, Indonesia

Corresponding e-mail: althafauliawan@gmail.com¹

Abstract. In entering the era of Industrial Revolution 4.0, Artificial Intelligence (AI) becomes one of Japan's choices after experiencing economic stagnation. Without exception in education, the Japanese government continues to encourage the usage of AI to help human work because it is considered more practical and efficient. Recently, Toda City, Saitama prefecture, Japan has taken the initiative to use AI robots for English conversation classes in elementary schools. AI Robot is considered efficient because English conversation skill in Japanese schools is still lacking, and the practice still relies on the Assistant Language Training (ALT). The purpose of this study was to determine the relationship between the usage of AI robots with city revitalization through education. Besides, this study was conducted to find out the effectiveness and weaknesses of AI robots when used in teaching English in schools. This research method is a qualitative method with case studies in Toda Daini Elementary School, Toda City, Saitama Prefecture, Japan, through interviews. Also, Toda City Board of Education’s literature data was used for this study. The results of this study show that the usage of AI robots has an effect on city revitalization, and has advantages and disadvantages in implementing English teaching in Japan.

Keywords: AI Robot, English Language Teaching, Education, Revitalization

1. Background
Toda City is a city that has the potential to enter the Industrial Revolution 4.0 era. Geographically, this city is part of the Saitama prefecture, Japan, and is adjacent to Tokyo metropolitan (bounded by Arakawa river). Toda City has been the “youngest town” in Saitama Prefecture for 23 consecutive years, with an average age of 40.5 years. As a result, the demand for childcare in Toda City is increasing due to the inflow of child-rearing generations. Based on data, Toda City is considered to have a high population and is expected to increase by 15.8% in 2045 from 2015 [1]. This may be in conflict with our current perception of population growth in Japan that continues to decline due to declining birth rates.
Therefore, because Toda City has tremendous potential, Toda City Board of Education has taken the initiative to revitalize the city through improving education since 2015. Toda City Board of Education believes that by developing local human resources through education and knowledge, these can become a viable way effective to revitalize the city and get the maximum effect at minimum cost in the midst of the crisis that hit Japan in the future [2].

In this initiative, Toda City Board of Education is developing an education reform program that contains new ways to realize children with 21st-century skills. In other words, children who are educated in schools are expected to have non-cognitive abilities so that they can withstand future developments in the future, especially in the use of digital technology. Togasaki added that the child's current non-cognitive abilities in OECD competencies are the ability to use social and technical tools interactively, the ability to form human relationships in groups, and the ability to act independently [3]. In addition, Toda City Board of Education also created a PEER Program, the contents of which are programming education, economic education, reading skills, and improvement of English language skills for children [4].

To realize this program, Toda City Board of Education proactively cooperates with private industry, academics, government (from both regional and central), and local communities. In its implementation, Toda City Board of Education tries to conduct a variety of trials together at a low cost, focus on what resources are successful, and provide empirical data to each other. In addition, the promotion of collaborative learning is also carried out. For example research classes working with Tokyo University, advancing science and mathematics education with the National Institute of Informatics, and future study support projects that utilize advanced technology [5].

Interestingly, Toda City Board of Education has also collaborated with industry (Softbank CS) to conduct empirical studies on the use of AI robots in teaching English to elementary school level [6]. This situation is certainly a concern where the results of a collaboration between the government and private industry produce new ways that are likely to be useful in future education. This research tries to find out how the relationship of AI robots in teaching English can be used to revitalize Toda City. In addition, the advantages and disadvantages of AI robots in teaching English are also known. This research takes a case study at Toda Daini Elementary School, which is the first school to use AI robots in Toda City.

2. Sangakukan Renkei
Sangakukan Renkei comes from the words San (industry), Gaku (academics), and Kan (government), while Renkei means collaboration. In other words, Sangakukan Renkei refers to a collaboration between the industry as a group that carries out commercial activities, academics such as universities or universities of technology, and government (both national and regional) that makes policies to improve infrastructure,
technology, and science. Previously, the collaboration between industry and academics was quite active in Japan. The basic laws of science and technology came into force in 1995, and the basic plan for technology was decided in 2001. Because it requires funding and public testing, a collaboration between industry, academics, and the government becomes a clear axis [7].

Based on the article of the Japan Ministry of Education, Culture, Sports, Science, and Technology (MEXT), there are various forms of industrial, academic, and government collaboration, namely:

1. Cooperations in education such as internships in companies and joint development of educational programs,
2. Research activities such as joint research and contract research between companies and universities,
3. Entrepreneurships based on the results of university research and human resources,
4. Consultant activities by researchers, such as technical guidance based on a part-time system,
5. Technology transfer activities related to university research results such as the TLO (Technology Licensing Organization) [8].

The collaborations above are certainly related to one another. Then, in the era of new knowledge, the collaboration now is not only focused on technological innovation, but also solutions to social problems. However, there are also collaborations with research results that require money and time to be commercialized and transferred to small and medium companies or venture companies [9].

3. Methods

The research method that was used is a qualitative method. The reason for this research to use a qualitative method was because the data used to answer the problem are soft data (in the form of readings, symbols, and photographs) that cannot be explained with numbers. Creswell added that qualitative research included a large amount of primary literature at the beginning of the study to provide direction or guidance on research questions and hypotheses [10]. Therefore, this research first conducts a review of relevant literature and uses the theoretical foundation as a guide so that the focus of the research is in accordance with the facts in the field.

This research takes a case study in Toda City, Saitama, Japan, because the city was involved in the first initiative in Japan that utilizes industrial, academics, and governmental cooperation to realize city revitalization through education. Therefore, to obtain secondary data, this study uses written data published by Toda City Government and Toda City Board of Education. Then to obtain primary data and information about the use of AI robots in teaching English in detail, the author conducted an interview with the principal of Toda Daini Elementary School, Toda city, Saitama, Japan in July 2019.

4. Discussion

With amendments to the new Toda city government law, Toda City education system moved to the new Toda City Board of Education system since early 2015 and formulated Toda City Education Promotion Guidelines [11]. At the same time, Toda City Board of Education promotes further education in collaboration with industry, government, and academics, and looks forward to the education needed for children living in hard-to-see communities (digital society).

To meet future challenges in Japan, Toda City Board of Education made educational reforms that focus on children so that they have non-cognitive abilities or 21st-century skills (skills to deal with the times and technology). Besides that, Toda City Board of Education manifesting image for Toda City children who have hope, caring, and go through all the way to open up the future from three power which includes certain learning, rich heart, and healthy body [12]. Therefore, along with the promulgation of Toda City Promotion Guidelines, Toda City Board of Education also seeks to create new learning, nurture teaching staff, and change new administrations. In other words, Toda City Board of Education is involved in the first initiatives in Japan that utilize industrial, governmental, and academic knowledge resources, specifically in the
development of rubrics to improve student teaching and self-assessment, specifically for the tests of reading skills, programming classes, and economic education [13].

Considering the above, recently, Toda City Board of Education also making new efforts for the education reform program, which included EBPM (Evidence-based Policy Making), improving class skills, promotion of new learning, promotion of education and technology, and responding to diverse needs. And then in promotion of new learning, Toda City Board of Education also launched an interesting program called PEER Program [14]. This program is carried out in collaboration with industry, academics and the government. PEER Program stands for Toda City's education which focuses on improving the ability of elementary school and senior high school children in terms of programming education, economic education, english language skills, and reading skills. Running this program certainly involves a variety of digital or ICT technologies that are in line with the needs of the times. The goal of the PEER Program is to give children the ability to survive in societies where globalization and computerization are changing rapidly, and problem-solving abilities, thinking skills, and communication are not only filled with knowledge, where they are not anything other than 21st-Century Skills. Previously, Toda City Board of Education had also conducted various trials and promotion of collaborative learning with private industry, academics (universities), and the government (both central such as MEXT, and regions such as Toda City government).

In English education and promotion of collaborative learning, Toda City Board of Education and Softbank Commerce and Service Co., Ltd. have collaborated to create an English conversation class activity with AI robots for elementary and junior high school in Toda City, Saitama, Japan [15]. This initiative was carried out because Toda City focused on English education and had started active conversation classes before the Japanese government made English a compulsory subject for elementary schools starting in 2020. In October 2017, an AI robot named Musio was introduced at Toda Daini Elementary School for teaching English twice a week to fifth graders. Musio is an AI robot developed by the AKA company, Inc. headquartered in the United States (AKA Study Limited, California) and headquartered in Japan (AKA LLC, Tokyo). Currently, Musio is sold at 107,800 yen per unit, weighing around 850 gram, 174 mm wide and 218 mm high, 10,800 mAh battery, Android OS (5.1.1), and wireless LAN supported by Wi-Fi 802.11b / g / n, Bluetooth 4.0 Low Energy [16]. There was a major update to Musio in November 2017, and it is possible to keep the data up to date by uploading teaching material to the server [17]. The way Musio works can be directly carried out through reciprocal conversations in English in accordance with the required topics. Currently, besides having the ability to recite and hear using teaching materials, Musio is able to have a free AI-based conversation feature, so that it might be used for English conversation that is adapted to the school curriculum.

Figure 2 AI robot named Musio to practice speaking English in Toda Daini Elementary School class

Source: prtimes.jp, 2017
To find out more information about the use of Musio, this study conducted an interview with Odaka Mieko as the headmaster of Toda Daini Elementary School, Toda City, Saitama Japan in July 2019. Mieko said that since Musio was introduced, the students felt happy, there was no anxiety, and quickly got familiar because of its funny shape. Then, when students talk to Musio, they become confident and can communicate with their friends in English without shame. This situation is as reported by Kyodo News that some students who interact with Musio feel more comfortable than with the teacher, and others say it is easier to practice speaking [18]. In addition, Musio is considered to have other advantages, namely being able to record the English conversation of students making it easier for teachers to assess. Mieko said that in its implementation, Musio was indeed more effective and cheaper than Assistant Language Training (ALT). This is evident when Toda Daini Elementary School employs 2 ALT people from abroad, it turns out that there is still a shortage (especially in terms of intensity and supervision of students) because they have to deal with the number of Toda Daini Elementary School students that reaches to 1000 people. However, if there is Musio, there are only 30 robots or 20 robots, children can practice more English conversations and can be recorded easily for assessment. In addition, Mieko added that ALT also needs salaries every month, which is calculated annually tens of millions of yen. On the other hand, even though the AI robot costs 100,000 yen per unit, it can be used for English conversation classes at any time. This is like the opinion of Masataka Kan, Professor of Shoin Osaka Women's University, adding that with the existence of AI robots, the burden of education budget is lower when compared to ALT rental [19].

Even so, Mieko also explained Musio's weaknesses for teaching English, because Musio's abilities were considered to be still limited and relied on Big Data. In addition, because it is limited as a robot, Musio is considered to have no expression and response outside of language like humans. Musio is only used to help improve students' English speaking skills, which in the end is applied in conversations between friends or between people.

Therefore, Mieko emphasizes that with Musio's existence, it does not mean that there are signs that future teachers will be replaced by robots in English conversation. Teachers remain leaders and focus on the educational points of Toda City today, namely to produce students who can compete in globalization and have 21st-century skills. In addition, it is supported by Toda City Board of Education which has provided training in its program to realize city revitalization through education, such as training in the use of tablets for education and management of school facilities.

Actually, Musio, which is used for English conversation classes, is still in the development stage and has been made into an empirical study by Toda City Board of Education in collaboration with Softbank CS. This year, Musio cannot be used anymore at Toda Daini Elementary School because the contract period has expired. Mieko added that the English curriculum at her school was decided by Toda City Board of Education and her school could not rent Musio, even buy it. According to him, public schools in Japan do not have that much money and if Toda City Board of Education buys them, Musio will be taken to school. In addition, the facilities purchased by Toda City Board of Education for education are numerous so that Musio's priority in teaching English is low. Even so, this year's Toda Daini Elementary School still uses tablets for teaching without using Musio.

In other words, Toda Daini Elementary School does not have the policy to hold Musio because it has a system that is regulated directly by Toda City Board of Education. All state educational institutions in Toda City are part of Toda City Board of Education that has utilized cooperation with private industry, academics, and government (from central to local) (Sangakukan-Renkei). Sugimori Masayuki as the Head of Policy Section of Toda City Board of Education in an interview by email on October 2019, said that to realize this cooperation, Toda City Education Board members has visited various seminars and gone to build relationships or networking with each other.

In addition, outside the system of cooperation between private industry, academics, and government, Toda City Board of Education actually also work with local communities to realize 21st-century skills
programs for children. The local community in question is Toda City stakeholders, such as NPO (Non Profit Organization). In addition, Toda City Board of Education has also created social media accounts, such as Facebook, to create information and communication that is effective and flexible for the public. Thus, Toda City Board of Education does not only apply the concept of collaboration between industry, academics, and the government because it has involved the role of Min (community) in Toda City. Therefore, this concept is not only referred to as Sangakukan-Renkei, but also as Sangakukan-min-Renkei.

This situation is a new finding and has the potential for use in the future, given the increasingly complex conditions of society without exception in the world of education. The role of the community or stakeholders is very involved even in the field of education in Toda City. Furthermore, the same Toda Daini Elementary School, has opened cooperation with several companies (with Google, Softbank, Benesse, Epson, etc.), the government (with the government of Toda City, Saitama Prefecture, and MEXT), academics (together with Waseda University), and stakeholders such as PTA (Parent-Teacher Association) or Oyaji no Kai (Father's Association of Educated Children) which also shows clearly that the climate of collaboration in Toda City is so real.

Figure 3 Institutions cooperating with Toda Daini Elementary School, from Industry, Academics, Government, and Communities (San-Kan-Gaku-Min Renkei)

Therefore, it can be said that the procurement of AI robots such as Musio in Toda Daini Elementary School still has strong control from the government, even though it is still in an experimental or empirical study stage. Masayuki said that Toda City Board of Education always thought it was necessary to advance the development of Musio products to a certain extent to be truly introduced in every school. Musio is an interesting concern because it is one of the new ways of teaching English in Japan. Based on the results of Toda City Board of Education meeting on November 15, 2017, Musio was considered to be introduced to other schools because it proved effective and was supported by the situation of teachers in Japan who are very busy in the world [20].

Thanks to Musio, Toda Daini Elementary School, and Toda City have been highlighted by national and international media in Japan, such as Japan Forward, SBS News, and PR Times. In addition, interviews with Odaka Mieko (Toda Daini Elementary School headmaster) about Musio in About English News also showed that English education in Toda City was quite advanced [21]. In other words, Toda City became famous thanks to the use of AI robots in teaching English, which would facilitate the process of revitalization through education.
Although Musio has future potential for city revitalization through education, Toda City Board of Education continues to proactively collaborate and continue to develop teacher training to realize the skills of children in the 21st century. This situation is in line with Kanamaru's opinion that teachers in primary schools, in particular, must be given support through seminars and training, expressing hope that AI robots will help their efforts. Robots can add to the role of teachers as conversation partners, so governments, industry, and academics must coordinate in conducting research to clarify quality and cost issues [22].

5. Conclusion
AI robot can be said to be a new way of teaching English in Japan, although it still needs further proof. Then, it was supported by strong control from Toda City Board of Education which uses the concept of industrial, academic, government, and community collaboration, showing that Robot AI has a good and guaranteed influence for city revitalization through education. In addition, information dissemination through the mass media is so fast, so that AI robot can strengthen the image of Toda City as an advanced city in the world of education even though the AI robot is still in the stage of empirical studies at Toda Daini Elementary School. Even so, Toda City Board of Education still has to work hard to realize education reform through teacher training, bearing in mind that AI robots have been proven to have strengths and weaknesses.

References
[1] Toda City 2018 Overview of Toda Childcare Creation Project Conference Toda City Official Site from [http://www.city.toda.saitama.jp/soshiki/252/hoikuen-purojekuto.html](http://www.city.toda.saitama.jp/soshiki/252/hoikuen-purojekuto.html) October 12 2018
[2] Togasaki, Tsutomu 2017 Revitalization Board of Education by the New Board of Education [Japan Ministry of Education, Culture, Sports, Science and Technology (MEXT)](http://www.mext.go.jp/a_menu/chihou/1382481.htm) February 2017
[3] Togasaki, Tsutomu 2015 Open School and Aim for WIN-WIN Collaboration between Industry and Academics. Promote Collaboration between Industry, Academics and Government in Toda City, Saitama Prefecture, and Deepen Collaborative Learning and ICT Utilization in [Board of Education Version Journal Article](http://www.city.toda.saitama.jp/koho-toda/170501/pdf/02-03.pdf) Vol 3: 2015 pp 6 – 7
[4] Toda City 2017 Development of “Toda City PEER Program” in Collaboration with Industry, Government and Academics in Toda City [Toda City Official Site](http://www.city.toda.saitama.jp/soshiki/252/hoikuen-purojekuto.html) May 1 2017
[5] Togasaki, Tsutomu 2015 Open School and Aim for WIN-WIN Collaboration between Industry and Academics. Promote Collaboration between Industry, Academics and Government in Toda City, Saitama Prefecture, and Deepen Collaborative Learning and ICT Utilization in [Board of Education Version Journal Article](http://www.city.toda.saitama.jp/soshiki/252/hoikuen-purojekuto.html) Vol 3: 2015 pp 6 – 7
[6] PR Times 2017 Saitama Prefecture Toda City Board of Education and Softbank Commerce & Service Collaborate in English Education [PR Times Online](http://www.prtimes.jp/main/html/rd/p/000000050.000022656.html) October 20 2017
[7] Tamura, Nori & Satoshi Someya 2005 Industry-University Collaboration [Communication Science](http://www.city.toda.saitama.jp/soshiki/252/hoikuen-purojekuto.html) vol 22(20050310) pp 191-209
[8] MEXT 2003 The Significance of Sangakukan Renkei: Industry, Academics, Government Collaboration for the Development of Universities and Society in the Era of Knowledge [Japan Ministry of Education, Culture, Sports, Science and Technology (MEXT) Article](http://www.mext.go.jp/b_menu/shingi/gijyutu/gijyutu8/toushin/attach/1332039.htm)
[9] Nojiri, Akira 2006 Promoting a New Trend in Intellectual Property Strategy, Industry-Industry Collaboration [Chizai Awareness Website](http://www.mext.go.jp/b_menu/shingi/gijyutu/gijyutu8/toushin/attach/1332039.htm) Article from [http://chizai.nikkeibp.co.jp/chizai/etc/nojiri20060425.html](http://chizai.nikkeibp.co.jp/chizai/etc/nojiri20060425.html) April 25 2006
[10] Creswell, John W 2014 Research Design (California: SAGE Publications)
[11] Togasaki, Tsutomu 2017 Revitalization Board of Education by the New Board of Education Japan Ministry of Education, Culture, Sports, Science and Technology (MEXT) from http://www.mext.go.jp/a_menu/chihou/1382481.htm February 2017
[12] Toda City 2017 Spear Rope about Education Promotion of Toda City Toda City Official Site from https://www.city.toda.saitama.jp/uploaded/attachment/19292.pdf April 1 2017
[13] Togasaki, Tsutomu 2017 Revitalization Board of Education by the New Board of Education Japan Ministry of Education, Culture, Sports, Science and Technology (MEXT) from http://www.mext.go.jp/a_menu/chihou/1382481.htm February 2017
[14] Toda City 2019 About Toda City Education Reform Toda City Official Site from http://www.city.toda.saitama.jp/soshiki/373/kyo-kaikaku.html April 1 2019
[15] PR Times 2017 Saitama Prefecture Toda City Board of Education and Softbank Commerce & Service Collaborate in English Education PR Times Online from https://prtimes.jp/main/html/rd/p/000000050.000022656.html October 20 2017
[16] Softbank Selection 2019 Because Equipped Musio X (Artificial Intelligence) Robot, Robot Capable of Two-way Communication Using English Softbank Selection Online Shop from https://www.softbankselection.jp/onlineshop/campaign/musio/
[17] Takashi, Tanda 2019 English Lessons Using AI Robot Doshisha University Journal Article Tokushuu 145 2 pp 8 – 13
[18] Kyodo News 2018 Schools in Japan Turn to AI Robots for Help With English Classes Kyodo News from https://english.kyodonews.net/news/2018/10/af3be9aa244b-ai-robots-may-lend-hand-in-japans-english-classes.html October 22 2018
[19] Hamakawa, Taichi 2018 Japanese School Kids Learn English from AI Robots Japan Forward News from https://japan-forward.com/japanese-school-kids-learn-english-from-ai-robots. November 3 2018
[20] Toda City 2017 Board of Education Minutes and Materials [2017] 11th Meeting Toda City Board of Education Site from https://www.city.toda.saitama.jp/uploaded/attachment/24725.pdf November 15 2017
[21] World Family 2019 English Conversation with AI Robot! English Education is Progressing in Toda City, Saitama Prefecture -Interview with Odaka Mieko, the Principal of Toda Daini Elementary School About English News from https://world-family.co.jp/why/news/201903-08.html March 27 2019
[22] Kyodo News 2018 Schools in Japan Turn to AI Robots for Help With English Classes Kyodo News from https://english.kyodonews.net/news/2018/10/af3be9aa244b-ai-robots-may-lend-hand-in-japans-english-classes.html October 22 2018