116-0002
2-20-7 Arakawa Arakawaku Tokyo Japan

ISSN 2435-3345

Robotics & AI Ethics

2019 4(2)

<Index>

J-INSTITUTE

2019 4(2) 1-5 Submission: 2019/11/10, Peer review: 2019/11/20, Accepted: 2019/11/25, Published: 2019/12/30

Robotics & AI Ethics

Publication state: Japan
ISSN: 2435-3345

Publisher: J-INSTITUTE
Website: http://www.j-institute.jp

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http://dx.doi.org/10.22471/ai.2019.4.2.01

MORAL Teacher and Immoral School: A Case of Chinese School

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Abstract

This study aims to inquiry the way to solve the current moral problems of the school in China. Based on C-score Algorithm of Moral Competence Test(MCT), this wants to show the alternative to China. C-score's main idea could be summarized "lowly orientation to the lower values, and highly orientation to the higher values". In the classroom or some places where teachers feel to educate or share some opinion with students, it is impossible for teacher to handle their students' whole schedules, interests, and moral tasks. This research used conceptual model based on C-score to imply to Chinese educational environment. But the method was not real made experiment but to make and show the conceptual model as one of the framework. The result of this research waits for the empirical results through deeper experiment. Finally this research could catch the point that morality could be improved through the process of collaboration between individual as moral agent and school as environment.

[Keywords] ***C-Score, Moral Competence Test, Moral Teacher, Chinese Educational Environment, Chinese School Morality***

1. Introduction

On human being, long time ago, in oriental society, Xunzi(荀子: 298? ~ 238? BC) had asserted that the basis of every human is bad or evil. Even his idea was confronted with the teaching of Confucius(孔子) Mencius(孟子). But it had still been influential theory until now in the Confucianism. Because human beings is evil in the basis of nature, so they seeks profits from the day of birth, be jealousy and hate each other, further they don't stop fighting. Therefore, he insisted that in order to correct this, every human beings have to learn the manners and need to practice the spirit. His main slogan could be explained in the concept of 'transforming human through intentional effort'(化性起僞) which means that to change human nature the education is very important[1].

Along with this position, in modern western society, Reinhold Niebuhr, an American Protestant theologian at Union Theological Seminary (UTS) in New York City asserted that people are more likely to sin as members of groups than as individuals. He drew the book's contents from his experiences as a pastor in Detroit, Michigan prior to his professorship at UTS. The book attacks liberalism, both secular and religious. In this book, we can guess that he tried to focus on the reality of the social morality[2].

Those two theories could be applied for us to explain the complex situation of modern society. So even all human beings are good, it is possible that the community of the all human beings could be evil or bad. Whenever teachers want to educate and guide the students, separately with the importance of the nature of the students, it means that teachers

need to take care of whole related variables like environment, the relationship among students' friends etc.

Recently, the Ministry of Education of the People's Republic of China issued the 'School Disciplinary Consultation Draft' to solicit opinions and suggestions from all Chinese citizens about education and punishment. In order to institutionally restrict the way that teachers manage students. However, how do teachers make the right choices when they encounter moral dilemmas? Do they have the ability to judge morally? How to improve moral judgment? It has become the key to the research of this paper. In China, teachers improve their professionalism and morality by participating in continuing education. China's continuing education started late, and there is no accurate way to measure moral ability in the continuing education system. The way to improve moral ability is still vague. This article uses Professor Linde's Moral Competence Test(MCT) to conduct a sample analysis of secondary school teachers participating in continuing education to compare the moral judgment and moral orientation of urban and rural middle school teachers. Explore the level of middle school teachers' moral ability and how to improve their moral ability.

2. Literature Review

2.1. Educational disciplinary

Educational disciplinary means that teachers and schools punish their students when they violate discipline or engage in moral misconduct. The purpose is to make students recognize mistakes and take warnings through the method of educational disciplinary. Disciplinary education is a part of a traditional oriental culture that can be traced back to Confucianism. Confucianism advocates an education model of '仁' (Ren), but it also proposes that violation of the '礼'(Etiquette) will punish by '罚' (Punishment). In other words, when students violate etiquette, they will be punished accordingly. In the book of the Changes, it proposes "小惩大戒" which means that when a person makes a small mistake, he or she should punish in order to prevent a more significant mistake in the future. In the 17th century, Czech educator Comenius believed that we could start with a particular proposition that those who commit mistakes should punish. The reason they should punish is not that they have done wrong(because what has done cannot be turned away), but because they do not make mistakes in the future[3]. John Locke, a British educator, discusses educational discipline in "Some Thoughts Concerning Education." He opposes excessive punishment for children but also believes that punishment cannot waive. Locke believes that good and evil, reward, and punishment are the only behavioral motivations of rational animals. They are all incentives and restraints for humans to work and be guided by them, so they should also use for children[4]. Both in Eastern and Western educational thoughts, it is believed that disciplinary support needs in educational activities. However, these ideas have the same flaws, and under what circumstances can education punishment be implemented. There is no single reason when a student makes a mistake. How to judge whether to punish or not is the key to research. A teacher who, as the executors of educational disciplinary, their moral judgment ability will affect the implementation of educational disciplinary.

2.2. Moral competence test(MCT)

Professor Lind proposed the moral competency test in Germany in the 1970s. This measurement based on Piaget's study of children and Kohlberg's study of adults. This scale measures the moral and psychological tendencies of the testees through the moral judgments made by the decisions of the protagonists in the two stories. Kohlberg uses this term to describe the six stages of moral development, which demonstrate the moral value of the testee. This measurement can be used to explore the two good ability outcomes of teachers[5]. First of all, through the results that teachers can be intuitive to have moral judgment. Specifically, teachers make

judgments based on the reasons when students violate discipline or do counterintuitive things. If teachers have not moral judgment ability, they may act sideways, such as ignoring them or rejecting them altogether. Secondly, teachers' inclination to things of different moral values can obtain through measurement. The basis for different moral tendencies may produce different moral behaviors.

2.3. Moral orientation

As mentioned earlier, the moral ability test can help researchers test the moral tendencies of the researched. Moral tendency mainly includes three categories, from low value to high value. Professor Lind believes that in an ideal environment when people face low-value things, people will make low-value judgments. Conversely, when people face high-value things, they make high-value judgments[5]. For example, when a student commits a low-value error, teachers should not choose a severe punishment method. They should look at the problem more objectively. However, when a student violates a principled issue, the teacher should impose severe punishment on the student.

2.4. Moral education

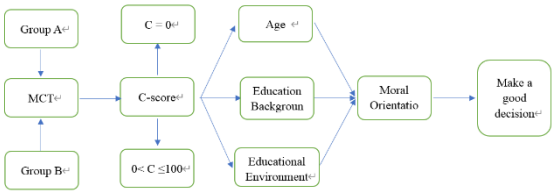
Aristotle considers the virtue of being both moral and intelligent. Intellectual virtues are created and developed through education, while moral virtues develop through habits. People gain moral virtue through exercise; they become impartial through justice; they become temperate through restrained behavior; they become brave through courageous behavior. Therefore, Aristotle believes that solving problems through behavior is the only way in the field of ethics[6]. Moral education applies not only to students at school but also to teachers. According to Professor Linde's research, when people leave school to study, their moral abilities will decline. Therefore, teachers need to re-learn through continuous education to improve their moral judgment. The moral education system is to improve people's moral level by affecting their intuition. Because morality based on human intuition and personal feelings, intuition guides human behavior[7].

3. Model

3.1. Conceptual model

So far, these studies on the moral judgment ability, moral orientation, and differences of teachers in elementary and middle schools in China still lack empirical evidence to a certain extent. It proves that the teachers of primary and secondary schools do not have the high moral ability. Therefore, this article aims to explore the moral inclinations of primary and middle school teachers and analyze the reasons for their differences in moral ability based on two different experimental groups.

Figure 1. The conceptual model.



Note: Group A: teachers who come from the countryside; Group B: teachers who come from the city.

3.2. Development of research hypotheses

3.2.1. The result of moral competence test(MCT)

As can be seen, teachers need to have a sufficiently high moral capacity if the education sector implements educational discipline in an educational environment. They can make the right judgment at the right time and place. Based on this, this paper uses Hypothesis 1 to Hypothesis 3 to verify whether teachers have moral judgment ability. First, their teachers make moral judgments when students make mistakes. Because a single cause does not cause most of the reasons, teachers should give different punishment results for different objective reasons. Therefore, teachers' C-score should all be greater

than 0 and have higher scores. Second, this study selected two experimental groups for comparison who are from urban and rural teachers. The educational punishment system introduced this time is used nationwide, not in specific regions. So, whether teachers are from urban or rural areas, they should have similar moral judgment. In other words, they have no significant differences in their ability to judge morally. Third, based on Professor Lind's research, low-value things tend to have a lower moral tendency, and high-value things tend to have a higher moral tendency. Therefore, they should have the same moral tendencies when they face the same problems which come from rural and urban.

Hypotheses 1: All teachers who come from the countryside and the city have moral competence(C-score > 0).

Hypotheses 2: There is no difference between the two groups.

Hypotheses 3: Two groups of volunteers have the same orientation.

3.2.2. The relationship between result and reasons

Based on the possible C-score and the teacher's moral orientation, three possible reasons are assumed. First, when people continue to receive education, their moral competence values are relatively high. Conversely, when they leave school, their moral abilities decline over time — the number of teachers participating in the test not fixed. Younger teachers often participate in work for a shorter period and leave school for less time. Due to the late start of teachers' continuing education in China, most of the older teachers are new or have almost no continuing education. So, they may not have a high c-score. Second, there is a difference in the educational level of teachers in developed and underdeveloped regions in China. Although Linde believes that the level of education does not affect moral capacity, experiments conducted by Kang in China show that education level has specific effects on moral capacity[8]. Therefore, the relationship between education level and good judgment ability can through the experimental results. Third, in recent years, the phenomenon of corporal punishment in education has increased in rural schools. Teachers punish students who make mistakes through corporal punishment. On the contrary, it is difficult to see this phenomenon in urban schools. Therefore, the relationship between the external environment and moral capacity analyzed through hypotheses.

Hypotheses 4: The age of teachers affect moral orientation.

Hypotheses 5: The education background of teachers affect moral orientation.

Hypotheses 6: The educational environment of teachers affect moral orientation.

4. Conclusion

This research mainly explores the moral judgment ability and the moral tendency of teachers in primary and middle schools in China. By analyzing the results of the two-sample surveys, this research could find out the reasons that affect the differences in moral ability. Helping teachers make the right choices and provide strong support for school discipline when their students make mistakes. At the same time, this research helps teachers with continuing education. But this result came from just imaginary pilot test. Through further deep approach, the result of this research should be verified really.

Morality is to be closely related to the environment of man. Thus, for humans, morality is not necessary to survive alone. In other words, morality is a value required when living in community with others. China has plenty of tradition and history that have embraced a variety of values. These cultural assets could be useful for modern schools' teachers and student to teach & learn and cope to break through the complex modern industrial problems. Especially the algorithm of the MCT will be applied to improve the en-

vironment and the method of moral education in the classroom.

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2019 4(2) 6-13
Submission: 2019/11/10, Peer review: 2019/11/20, Accepted: 2019/11/25, Published: 2019/12/30

Robotics & AI Ethics

Publication state: Japan
ISSN: 2435-3345

Publisher: J-INSTITUTE
Website: http://www.j-institute.jp

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http://dx.doi.org/10.22471/ai.2019.4.2.06

IR4.0 and Ethical Tasks of AI

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Abstract

Based on the 4th industrial revolution(IR4.0), the entire social paradigm is rapidly changing. All human beings have to adapt themselves to the new environment every day and every moment. Their lives have been met the help of the Big-data and Artificial Intelligence. But this situations can give the anxiety and fear to human beings. So it is very necessary to inquire the reality and its impacts in terms of the moral point of view. In the smart community where humans and machines coexist, human beings should be at the center position. This means that human beings start with well understanding of human themselves and nature. In order to build a smart community with morality, this paper proposes that the algorithm of moral competence test(MCT) should be applied to Artificial Moral Agent(AMA).

[Keywords] ***4th Industrial Revolution(IR4.0), Smart Community, Artificial Intelligence(AI), Big-Data, Algorithm of Moral Competence Test(MCT), Artificial Moral Agent(AMA)***

1. Introduction

Recently, due to the development of science and technology, the paradigm for the industrial economy, society, and academic fields have met the very rapid changing pace. The speed pace will be exponentially accelerated since the 4th Industrial Revolution(IR4.0), which emphasizes convergent hyper-connectivity and super-intelligence in all fields[1]. However, as the development pace is fast, humans need to adapt to the new environments every day, and the effects on human and social decision-making processes have no choice but to be accelerated. This process is the anxiety and fear in human society, so it is necessary to separate them into the scientific and social aspects, and continuously to approach the problem solution in particular from an ethical point of view.

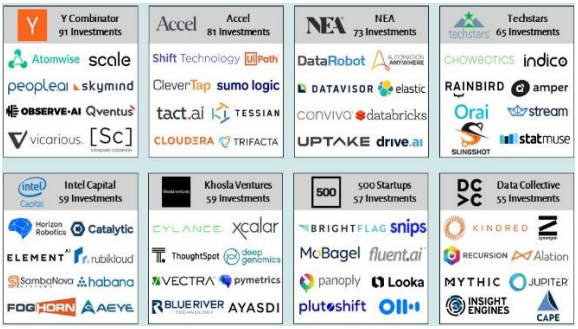
With the trend of IR4.0, all human beings inevitably have to meet the complicated ethical issues. The reason of one action is not just simple but so much. So the moral solutions should be complicated. If the government make policy, the public officials have to consider law, science, economy, environment, and others at the same time. This approach could be called a convergence.

Artificial intelligence(AI) is an example of the scientific methods based on convergence. As shown in <Figure 1>, Y Combinator is the most active investor in the AI sector with 91 investments, followed by Accel which is as venture capital firm based in Palo Alto, California with 81 investments and New Enterprise Associates with 73 investments. Rounding out the list is Intel Capital, the most active of corporate investors in the AI sector[2].

Recently, AI is increasing the degree of perfection based on Big-data as commercialization accelerates. Therefore AI becomes an important factor in all decisions of society, and it is necessary to present an ethical basis in humanities

and social aspects. The AI-based smart society in which human and machine are coexistence will meet the ethical issues soon. This is the reason why this kind of research starts.

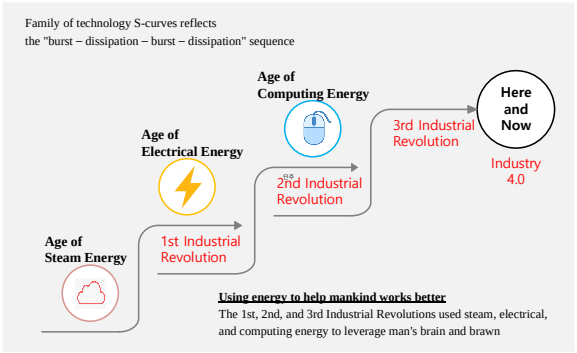
Figure 1. Current situation of AI[2].



2. IR4.0 and Smart Community

<Figure 2> shows the changing process of the industrial revolutions of mankind and its basic characteristics. Human beings have experienced the age of steam energy, the age of electrical energy, the age of computing energy, and now are about to meet and live the period of the 4th Industrial Revolution including AI.

Figure 2. Human being's industrial revolution and its characteristics.



Today's era is at the extension of the 3rd industrial revolution and is about to enter the gate of IR4.0. The current breakthrough is evolving exponentially and not linearly, unlike the previous industrial revolutions without any historical precedents. And it may affect almost all industries at home and abroad, the breadth and depth of these changes cover all areas including the production, management and governance systems[1][2].

The development of information and communication technology (ICT) has led to the rapid development of processing and storage capabilities as well as the connection of all things, providing an environment that can be controlled in real time regardless of time and place. As shown in <Figure 3>, it is made up of emerging technology innovations such as artificial intelligence, robotics, internet of things(IoT), autonomous vehicles, 3D printing, nano-technology, bio-technology, materials science, energy storage and quantum computing.

Current Big-data based artificial intelligence algorithm is applied to autonomous vehicles, drone, translation, investments, and games, and then this algorithm can be easily viewed from a variety of fields. This is made possible by the exponential growth of computing power and the availability of massive data.

Figure 3. Classification of IR4.0 technology.

(a) Advanced robots

(b) Big-data and analytics

(c) Simulation

(d) Augmented reality

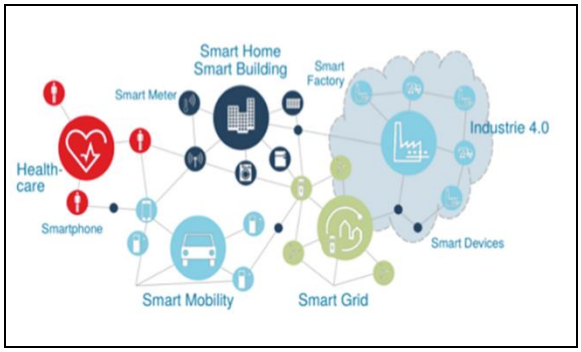
(e) Digital integration

(f) Advanced manufacturing

(g) Cloud computing

(h) Internet of things

Figure 4. Overall configuration of smart community.



As shown in <Figure 4>, the 4th Industrial Revolution fused physically, spatially and biologically to transform the conventional society into a smart city or AI based smart community. It can provide challenges and opportunities for humankind, but it is accompanied by damage.

The 4th Industrial Revolution has the potential to improve the quality of human beings' lives. Therefore, technologies applied to a smart society can provide new products and services that can increase efficiency and enjoyment. It has been to apply to taxis operating system, flight bookings, product purchases, payments, music, movies or games, anywhere and anytime in real time.

The 4th Industrial Revolution is particularly prone to disrupting the labor market, resulting in inequality in human societies and increasing conflict between machines and humans. But technologies like smart factories, introduced to increase efficiency in production and management, can move workers into a safe and rewarding field as a whole.

Digital technology dissemination and the dynamics of information sharing represented by social media is likely to cause human discontent. Such interaction in smart society provides opportunities for understanding and cohesion, but, may not only be propagated to create unrealistic expectations on the success to provide an opportunity for the extreme ideas and philosophy can spread[1][2].

Figure 5. Key issues and its related topics in IR4.0[1].

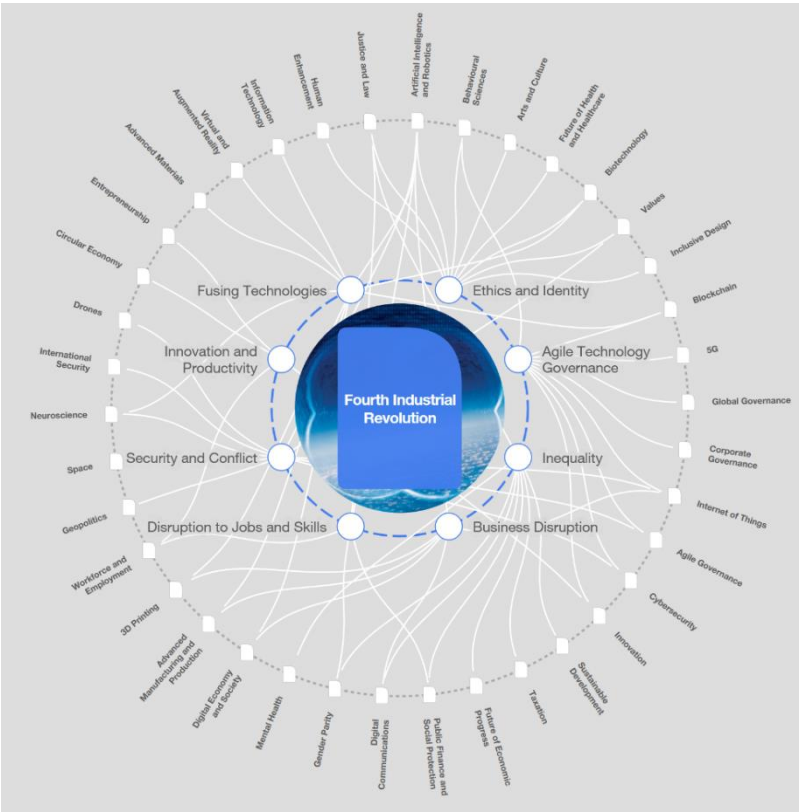
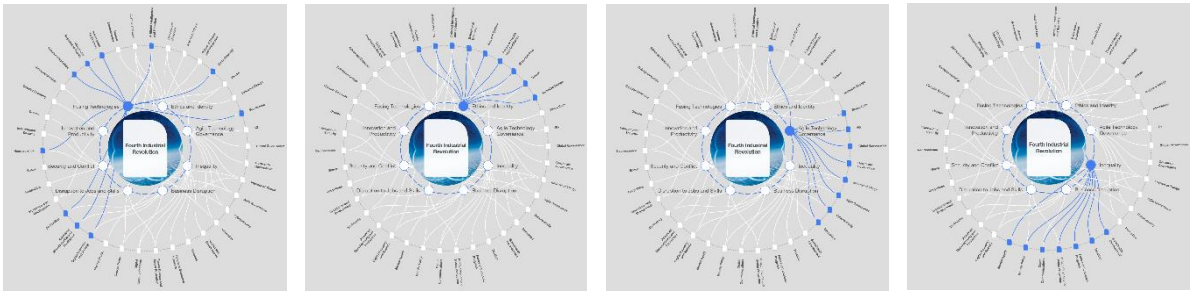
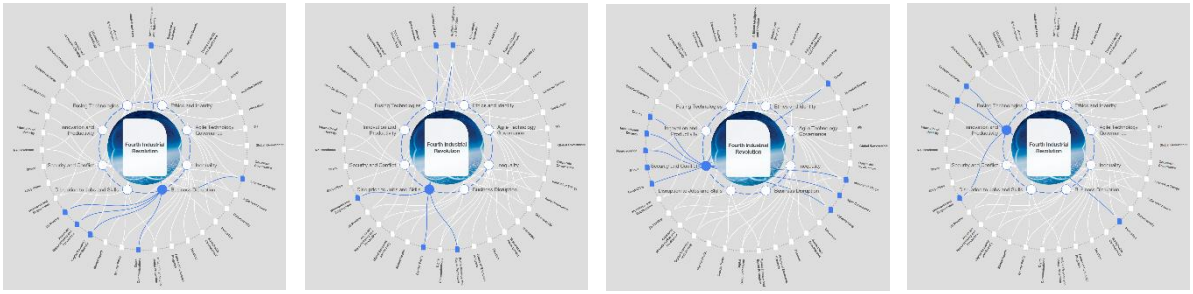


Figure 6. Mapping tree figure between key issues and its related topics in the fourth industrial revolution provided by world economic forum[1].



(a) Fusion technology (b) Ethics and identity (c) Agile tech. governance (d) Inequality



(e) Business disruption (f) Disruption to jobs and skills (g) Security and conflict (h) Innovation and productivity

Table 1. Mapping topic trees of key issues in the fourth industrial revolution.

no.	Key issues	Related topics of each key issue	Topics	
a	Fusion technology	2, 15, 23, 24, 25, 32, 35, 36, 37, 39	1	Human enhancement
			2	Artificial intelligence and robotics
			3	Inclusive design
			4	Justice and law
			5	Behavioral sciences
b	Ethics and identity	1, 2, 3, 4, 5, 6, 7, 38, 39	6	Values
			7	Future of health and healthcare
			8	Agile governance
			9	Global governance
			10	5G
c	Agile technology governance	5, 8, 9, 10, 11, 12, 13, 14, 15	11	Internet of things
			12	Corporate governance
			13	Innovation
			14	Cyber-security
			15	Blockchain

d	Inequality	4, 6, 16, 17, 18, 19, 20, 21, 22	16	Digital communication
			17	Public finance and social protection
			18	Future of economic progress
			19	Sustainable development
			20	Workforce and employment
e	Business disruption	16, 23, 24, 25	21	Mental health
			22	Taxation
			23	Advanced manufacturing and production
			24	Digital economy and society
			25	3D printing
f	Disruption to jobs and skills	2, 4, 20, 26	26	Gender parity
			27	Geopolitics
			28	International security
			29	Space
			30	Global risks
g	Security and conflict	2, 6, 8, 11, 14, 27, 28, 29, 30, 31, 32	31	Drones
			32	Neuroscience
			33	Circular economy
			34	Entrepreneurship
			35	Information technology
h	Innovation and productivity	13, 20, 33, 34	36	Virtual and augmented reality
			37	Advanced materials
			38	Arts and culture
			39	Biotechnology

In the smart society, the privacy is the one of the biggest problems exposed to information technology. Tracking and sharing personal information is important for the new connection, discussions on fundamental issues such as the impact on the inner surface of losing control of the data will be intensified in the near future. As the revolution made by the biotechnology and artificial intelligence, life, health, human beings could extend the limits of perception and cognition, the moral and ethical boundaries and definition should be changed. Humans have to show the worldwide vision in which IR4.0 can give to human common opportunities and strength for the future that reflect the goals and values, and smart technology affects human life, economy, and society, and environment. <Figure 6> and <Table 1> based on <Figure 5> show the relationship between primary issues and area of interest in IR4.0[1].

Human beings are usually trapped in traditional ways of thinking, or in a crisis that requires attention to strategically think about innovations and forces affecting the future. After all depends on the human and value and, to a man, and by giving priority to empowering get out of pursuing a future society that benefits all human. The 4th primary industrial revolution itself could be understood inhuman robotics. In other side, it could be a kind of being which can think and be a stewardship of mankind as a complement. So AI and human beings can have common objectives.

3. Ethical Consideration to AI Affairs

Ethics is the study of what is desirable, what is right and wrong. It could be divided into descriptive ethics, normative ethics and meta

ethics[3]. Among these, ethical inquiry related to AI belongs to normative ethics. Normative ethics is largely divided into teleology and utilitarianism. Teleology based on respect for norm emphasizes the natural duty of man to act in accordance with universal moral law[3][4][5][6]. Meanwhile, utilitarianism takes the position that it provides the most happiness for the most. Jeremy Bentham[7] and John Stuart Mill[8] took posture to support this idea. In addition, there are also tides such as caring ethics, responsible ethics and virtue ethics. Political ethics insists on liberalism and communitarianism, depending on where the individual and the community are stressed. John Rawls[9] and R. Nozick[10] were on the side of liberalism. Alasdair McIntyre[11] and Michael Sandel[12] are on the side of communitarianism. The latter's tradition came from Aristotle[13] and St. Thomas Aquinas[14].

With regard to AI, ethics requires a lot of preparation. Until now most of AI ethics researches have focused on how to use AI as a machine. So there has been interested in what developers and users should take ethical attitudes. In recent years, some interesting research like how to certify AI has been published on. Like this there is little interest in how to give ethical functions to AI itself. This is a side effect of the fact that humans went straight to the issue of AI ethics, without the academic interest in how to measure morality. Measurement technology is very important for AI researchers to start to build up the function and structure of AI. On ethics of AI itself about how they will ever control the mechanisms of moral psychologists, G. Lind made Moral Competence Test of C-Score. The algorithm indicates high and low morality by first establishing a hierarchy of values and weighting them accordingly. It would be applied to AI itself's ethics[15][16][17][18].

4. Conclusion

The paradigm of society has started to be changed internally and externally due to the Fourth Industrial Revolution, which emphasizes a variety of convergences. As a result, human beings must adapt to the new environment every moment, and the process of the decision making might be very complex and fast. This causes human being to get anxiety and fear in human society. Humans need to look at this problem from a more fundamental ethical point of view and find right and appropriate solutions. In the AI-based smart society where humans and machines coexist, judgment of human beings and AI should be based on ethical thinking. It could start at the position where we human beings understand the nature of us by ourselves.

Therefore, this paper suggests that measurement algorithm of morality should be imposed to the AI with the competence of human being. This idea will be devoted to establish smart society with morality soon.

AI does not distinguish between cognition and emotion, intuition, experience, and spirituality. However, made by the specific 0 and 1, AI would be good partner in communicating with human being. Now AI is emerging like a kind of nature. Francis Bacon, on the cover of the *Novum Organum*, published in 1620, presented the ship of science heading for the new grand ocean, symbolically, as a subtitle of this book, specifically with the Proverbs of Natural Interpretation and Human Domination[19]. If he lives with us today, he would say something about AI. "Man, being the servant and interpreter of **AI as Nature**, can do and understand so much and so much only as he has observed in fact or in thought of the course of **AI as nature**. Beyond this he neither knows anything nor can do anything." Let's go the grand ocean of AI. And let's understand and communicate with AMA.

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2019 4(2) 14-21

Submission: 2019/11/10, Peer review: 2019/11/20, Accepted: 2019/11/25, Published: 2019/12/30

Robotics & AI Ethics

Publication state: Japan
ISSN: 2435-3345

Publisher: J-INSTITUTE
Website: http://www.j-institute.jp

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http://dx.doi.org/10.22471/ai.2019.4.2.14

English TEACHING Method Using Flipped Learning in the Artificial Intelligence Era

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Abstract

The purpose of this study is to propose Teaching method and Application case for English education using Flipped learning in the Artificial intelligence era. The study is what flipped learning is and how it was reflected into the class through the design of an education model. The teaching method design is largely classified into three stages: Pre-class pre-study activities, In-class learning activities, Post-class review activities. And this paper examines class comprehension, problem solving performance through monitoring and real time feedback. The main focus of this study is to help learners with the core content so that the contents of online video lectures are not long(to minimize the burden of learning). Second, students can use smart apps in offline lectures to present problems based on the subjects of the lecture, to identify learners' learning content in real time, and to supplement the questions with detailed supplementary explanations. Third, simple content is produced and presented using various programs to encourage learners to actively participate in the class. Finally, it activates the exchange of opinion so that instructors can present problems according to learning topics and students express their opinions among learners. This paper shows that the class presenting appropriate topics and discussions with flipped learning can enhance the learners experience through creative image expression and cooperation ability by the use of questionnaires or surveys in the artificial Intelligence era. As the future society demands for problem-solving and creative convergence are growing, the results of this paper show that flipped learning based education model has revealed the importance of talent development for the future.

[Keywords] ***Flipped Learning, Teaching Method, Artificial Intelligence, Bidirectional Convergence, Kahoot***

1. Introduction

Beyond the 20th-century barriers led by the Internet-based computer information knowledge society, the Fourth Industrial Revolution was created by reorganizing organized knowledge information into convergence. The fourth industrial revolution, which began with the mention of Chairman Klaus Schwab at the 2016 Davos World Economic Forum, is "an era of technological revolution that is expected to build a super-intelligent society and a hyper-connected society through the integration of the virtual and reality, including artificial intelligence(AI)"[1]. The age of technological revolution is expected to establish a sustainable environment in which things can be recognized and controlled automatically and intelligently. In this age, which is represented by artificial intelligence(AI), 3D printing, manned drop, driverless cars, virtual reality(VR), and augmented reality(AR), natural science, engineering, and humanities are putting importance on social values through mutual convergence.

At the beginning of the 21st century, the emergence of the fourth industrial revolution is spreading in most industrial fields, with a focus

on hardware technology and software technology, towards a super-intelligent society and a hyper-connected society. In the industrialized society based on the 20th century automation system, expertise-oriented delivery education and standardized standard education were needed to cultivate talented people with expertise and skills in the relevant fields[2][3][4]. The global society of the 21st century based on the 4th industrial revolution is changing to education that show potential creativity from a new perspective using generalized information rather than acquiring generalized expertise. The future society in the 21st century strongly demands talent who can recreate new things by utilizing big data, talent who can communicate and collaborate with each other rather than talent with a single expertise, and talent who can have a broad perspective on things with humanistic and imaginative creativity[5][6][7].

Global leaders around the world stressed the need for talented people who could use big data to discover new items, explore wide and insightful problem-solving skills, and recreate them with imaginative ideas. A future society is expected to accelerate the requirements that global leaders emphasize[8]. In other words, there is a need for 'creative convergence talent' who can solve problems creatively beyond the scope of talent with basic academic skills or specialized expertise in the 20th century. The capacity of talent in the future society is changing and, it is foretelling the rapid change of the education system to nurture creative and convergent talent beyond the scope of traditional education method. However, universities, which are higher education institutions, are not able to properly respond with the rapidly changing times, and have many difficulties in cultivating talented people with the skills required by companies.

Advanced universities around the world, such as Harvard University and MIT, are attempting to develop and operate a variety of teaching and learning method programs to enhance the university's educational capacity[9], but are limited in delivering expertise to the 21th century learners in the 20th century educational environment. In other words, advanced universities continue to make efforts to create a bright future society by actively introducing a creative education system.

Some universities in Korea are also trying to change their teaching and learning methods, as part of their active countermeasures, and are overcoming the limitations of traditional teaching methods(lecture-based instruction) with the wave of the times[10][11][12][13]. However, universities play a role of nurturing talents that future society demand, but in reality, many constraints are involved to properly reflect the requirements of society. Moreover, research on teaching and learning methods has a lot of interest in universities, including instructors who deliver specialized knowledge to learners, but the willingness and effort to establish an efficient educational system is very lacking.

Universities, including instructors, need to change their educational paradigm such as the development and application of teaching and learning method that can create future values according to the requirements of the times. In other words, an educational environment is needed that can be changed from instructor-centered education, which is a traditional teaching and learning method, to learner-centered bi-direction communication. Based on this, learners should be nurtured to develop their creativity by inducing learners to express their potential imaginary images on the surface. In other words, the learner-centered teaching-learning method is to solve the fundamental problem by mutually interacting with other learners by making the best use of individual knowledge or big data in individual learners or small groups through the tasks provided by the instructor. Based on this, learners should pursue self-directed learning, imaginative creativity, and logical thinking that can solve problems on their own. As the change in talents required by the future society becomes a reality, if there is no innovative change in the education system centered on the paper-based exam in schools seeking to cultivate future talents, there may be many difficulties to cultivate creative talents that meet the requirements of the future society.

In this study, I propose a "Flipped Learning Model Design for English Learning" that focuses on collaborative learning activities, project-based learning activities, and problem-based learning activities. The educational system needed by future societies focuses on learner-centered, bi-direction creative convergence

thinking, rather than delivering traditional instructor-oriented one-way knowledge. Therefore, this study is a new teaching and learning method that focuses on learner's potential such as high-order thinking and imaginative creativity.

2. Reason for Introducing Flipped Learning to Class

As analog technology decreases, the smart environment of expanding digital technology is rapidly changing to real life. Learners are very familiar with games that use smart culture and smart apps like YouTube[14]. However, it is not enough to actually develop a bi-directional communication program that enhances the learner's learning effectiveness or improves logical thinking. The biggest problem with traditional learning method is that the willingness and effort to introduce a new education paradigm with the trends of the times is weak. The larger root cause is the lack of specific research on creative teaching and the development of diverse content. In other words, a simple infusion learning activity in which instructors provide a lot of expertise and learners passively accept the information knowledge in the classroom environment has the problem that the voices of the students do not exist anywhere in the classroom.

It is natural that memorization-oriented teaching-learning methods, which are universally used in university classrooms, have many difficulties in enhancing the higher-order thinking skills required of future society. In order to overcome the limitations of the existing passive explanation teaching method, In order to overcome the limitations of the existing passive explanation teaching method, learners should be encouraged to participate in the class voluntarily with interest in the class.

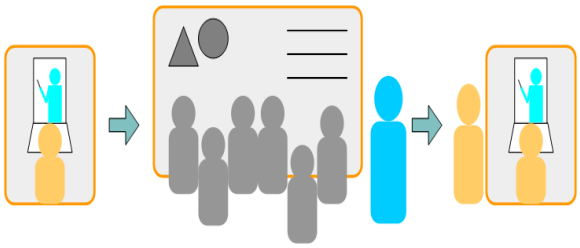
In order to improve the perfection of a class, it is necessary to make the most use individual learning activities in the offline classroom. As a way to solve this problem, the pre-learning activity of learning the materials provided by the instructor in advance is conducted in the online classroom[15][16]. In the online classroom, the class activity, the results of the assignment presented by the instructor are presented, and the field of learner interaction for problem solving is provided. Such teaching-learning method can cultivate talents that future society demands through learner-centered interaction learning activities.

This teaching-learning method is first flipped learning attempt by John Bergman and Aaron Sams at a rural school in Colorado, U.S.[17] Flipped learning is a learning method that instructs the teacher to transfer expertise and to reverse the process for learners to review and solve problems. In Korea, it is translated into 'backward learning', 'reverse learning' and 'flipped learning'.

The prominent feature of flipped learning is that instructor-centered explanatory learning activities(Pre-class) and learner-centered interactive learning activities(In-class), which can be combined. In other words, specialized knowledge is acquired by prior learning. In the classroom the main purpose is to provide learners with the environment to free their potential and imaginative creativity.

Flipped learning helps learners by optimizing their learning. It has the advantage of improving educational learning effects by providing individual level learning, improving learner's self-directed learning and cooperative learning ability, and providing learning activities to achieve high-level learning goals.

Figure 1. Class progress method using flipped learning[18].



We need to look closely at the problems of traditional learning. The biggest problem of traditional learning is that most learners who are familiar with the smart environment, interest in the classroom, are rigid and silent, are becoming less and less involved.

No matter how good the contents of the lesson is, even if the teaching method is adopted

and used in the class, it is natural that it is difficult to derive the effect of the class immediately if the participation of the learner is extremely low. The most efficient teaching and learning method is to constantly devise program development, and changing teaching styles to increase learner participation by making learners entertained and interested in classes.

Lewin, a social psychologist at MIT University in the United States, announced learning efficiencies called "Learning Pyramid"[19] by the National Training Laboratories (NTL), studying the learning effects of learning methods.

This pyramid is about how external information is stored in the human brain. It is a pyramid that shows the rate at which learners remain after a day has passed. In fact, if you take a lecture, after 24 hours, only 5% of your learning will be stored in memory, and if you are reading only 10% will be stored in memory. By comparison, 75% of the group discussions and 90% of the Havruta learning methods that spoke to each other were memorable, which is surprising.

The reason for bringing flipped learning to class is simple. This teaching method aims to maximize the efficiency of learning by minimizing the listening of lectures by professors and by increasing the weight of the process of producing and presenting lessons and discussions[20].

3. Application Example to English Class

Let's take a look at an example of applying the flipped learning method to actual English education. English reading education is the ultimate goal of understanding and practically using difficult English sentences, but the more important value of English reading is that students learn to understand the social and cultural backgrounds hidden in sentences and develop their ability to write sentences creatively.

First of all, I briefly talk about the purpose of the class and explain the process and method applied to the actual class in order.

The curriculum of this class is 'Intensive Reading English', and 48 students(grades 1-4) participated in the class. The learners read the syllabus and I explain the overall purpose of the class about how the course is progressing and how the course works.

This class is aimed at self-directed learning in collaboration with the other learners. Beyond the traditional way of teaching, understanding and completing lectures, learners read and summarize English on their own, understanding and analyzing the vocabulary and sentence patterns that are frequently used in the text, and the cultural, social background is also expanded. After reading, learners also used smart devices to solve problems, create questionnaires on topics, and share them with other members to help them think. In addition, students can freely select topics with their team members and produce their own creations such as researching the contents and analyzing contents.

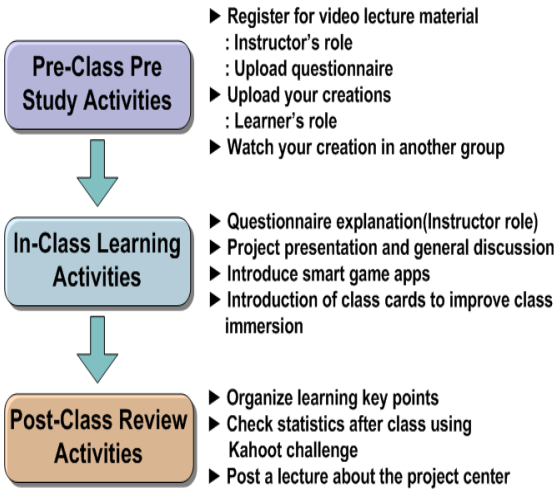
During class learning activities, students have time to expand their understanding of the contents of the class by discussing with other members. How to proceed to class is that the instructor creates the video as learning materials and upload them to YouTube or the band so that the learners can watch them.

In addition, learners were organized in small groups rather than individuals, and small groups were encouraged to freely select topics related to the content of study, make presentations with their members, and share them with other members.

After the presentation and discussion process in class learning activities. I proceed to improve the understanding of what is learned through the quiz or game using smart devices, which is very important. As it is the process of organizing the core content comprehensively about the learning content, the part that needs understanding in this process is made possible to use the smart device to provide feedback in real time regardless of time.

As shown in <Figure 2>, the class progress is divided into three stages: pre-learning activity, class learning activity, and post-learning activity.

Figure 2. Smart-based class application case.



○ Pre-class Pre Study Activities

The small group produce the assignments and register them in the archives, and the other members of the group are able to understand each group's presentation. At this time, the instructor suggests that the learners study the following.

First, when the final creations are completed by the members of the group, they are asked to upload two to three minutes of after-opinion video material about their role in the process of producing each creation. Finally, each creation is asked to post in the "Advanced English Reading" column on the left banner of Naver Cafe.

Second, other members of the group are required to watch the video material uploaded by the presentation group and to write more than one sentence in English for a particular part that is impressive. Third, I encourage students to prepare two or more questions related to class content and put them in the library for class materials in the banner of Naver Cafe.

10 points including the creation, presentation, and general discussion will be reflected.

The main focus of this class is that the clear distribution of roles should be preceded. The reason is that the learners can feel the importance of mutual cooperation among the team members in preparing the creation according to certain rules set by the small group, and they can express their intentions clearly and increase their ability by fully utilizing the creativity of individual learners.

○ In-class Learning Activities

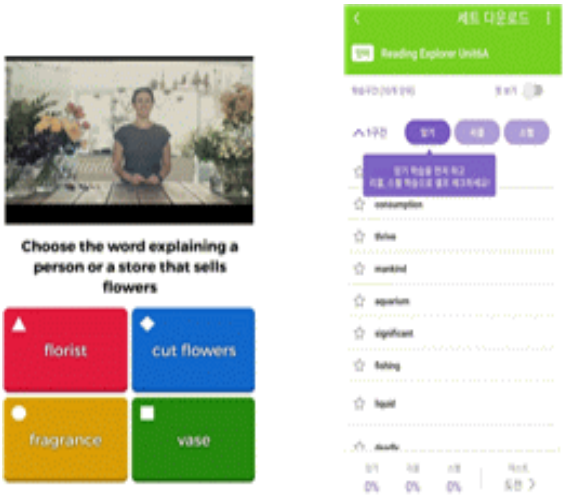
In a classroom where instructors and learners coexist, the way the lessons are taught should be fun, not boring. Even if it is applied a good teaching model such as flipped learning or PBL, the hard and boring teaching method, the difficult teaching contents, and the one-way knowledge transfer-oriented teaching and learning method will make learners turn away from the classroom. Learners will always be strangers, not subjects.

In this class, Kahoot, one of the smart game apps, is introduced as a smart English teaching method, which not only stimulated interest and fun in learning activities, but also increased class satisfaction. Kahoot is a way for instructors to install the Internet Kahoot program and post questions in the form of quizzes for class contents, and learners connect to smart devices to solve the problems. The sooner learners answer, the more points they accumulate.

Class cards also help learners to become more immersed in class when the class is less focused or difficult to learn.

Most of the learners said that the lessons were not boring, and it is not only fun to use Kahoot or the Class Card application, but also helped them to fully understand the contents of the class.

Figure 3. Class learning activities using game programs.



○ Post-class Review Activities

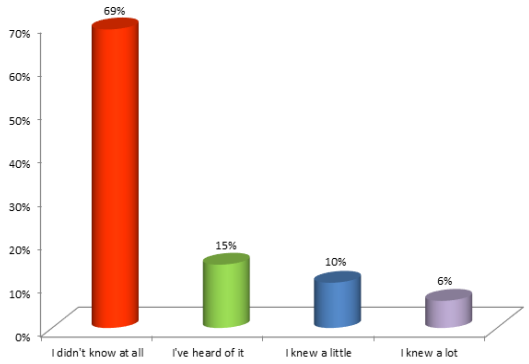
There are no non-critical steps in any area of the class, but I think the most important step is the post-class review phase. The reason is to identify the areas of low understanding by learners by organizing core learning content and finalizing the understanding of learners. Areas that need to be understood can be addressed with a supplement or supplementary explanations for the next class.

Lastly, I actively encourage students to make videos on YouTube for later reviews of class content, such as impressive sentences, vocabulary, or the entire content of the class

4. Survey Evaluation and Analysis

The evaluation and analysis of the learners' responses to the proposed teaching methods based on flipped learning, and the learning-assessment method was performed using the 'Google Questionnaire'. The credibility of the learner's evaluation fall, but it can be the cornerstone for further study of the class model.

Figure 4. Piror knowledge of class content to attending a class.

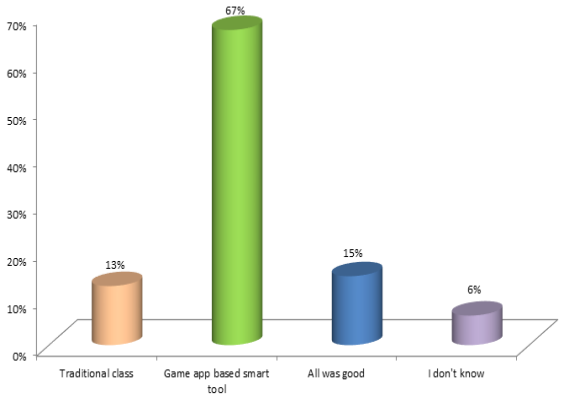


The number of people who participated in this survey is 48(1-4 grades), and the analysis is summarized as follows.

Asked about "pre-knowledge of class content before joining the class", more than half of the 69.0% say that they have no prior knowledge of the content.

On the question of "preferred teaching method among traditional class and flipped learning class models," the response that the proposed teaching method is good is relatively high at 67.0%.

Figure 5. What is your prefeered class method among traditional class and flipped learning class model?



And as to the reason why "flipped learning class models" are better, 58.3% responded that class time is not boring and expectation for class are fun, 54.2% answer that they could improve class contents or application skills, it is rated relatively high.

The traditional monolithic teaching method showed that learners were always silenced by their passive learning method. In order to cultivate convergence talents required by the future society, it is necessary to change the instructor's efforts and teaching model. The summary of the salient features of the proposed teaching method of English Education based on flipped learning is as follows:

- Project subject was selected by individual or small group to induce learner-centered class

: Team members and presenters who produced based on project-drive creation upload video materials according to selected topics

- Create a question after learning the video materials provided by the instructor in the pre-activity learning stage

: Instructor produces and uploads the necessary video materials for class(Instructor's role): Learners write the questionnaire after learning

the video materials uploaded by the instructor(Learner's role)

- Real-time Q&A between instructor and learners was conducted all step of the class.

- Smart game app "Kahoot" has been actively introduced to stimulate learners' learning motivation, interest, and immersion in class.

- In the course of learning activities, learners take the lead in class, record video and edit it, and share them in the library or YouTube.

: Create, edit and upload video materials on YouTube in small groups(Instructor's role).

: Create video about learners' mutual discussion process and upload it to YouTube(Instructor's role).

- After "Post-class review activity," each member of the group create video materials and upload them on YouTube

The evaluation and analysis of this survey let to the following conclusions. Although there are many learners who participated in this class without sufficient prior knowledge, it is concluded that teaching method based on flipped learning can increase the interest in class, with the increase student participation rate in the classroom. In addition it is resulted that flipped classroom can enhance the immersion degree, and improve their self-directed learning effectively in this study.

5. Conclusion

This study proposed the design of a teaching-learning method model based on flipped learning basis. At a time when future society for talents with problem-solving skills and creative imagination is increasingly demanding, it is necessary to develop teaching learning methods so that learners who take part in classes at universities, higher education institutions, can naturally increase their participation rate of classes beyond the scope of teaching-based learning.

In the online theory-learning phase, learners create questions about learning content with prior learning and perform the tasks assigned. In the offline practice stage, the instructor supplements the questions submitted by the learners with supplementary explanations and checks the understanding of the learning contents using smart tools.

In addition, the presentation group can improve the overall understanding, rational thinking, and self-confidence of the class contents through the presentation and discussion process. The prominent feature of the teaching and learning method proposed in this study is to encourage learners by increasing the participation rate of the learners with interest, to expand the opportunity for bidirectional communication between professors and learners, and to increase their understanding of the contents of the class by actively using smart tools to present problems and monitor the contents in real time.

Furthermore, the post-learning activity, inquiry-based learning, includes organizing the core contents of learning, sharing the results of learning activities, feedback on online discussion learning activities, including Q&A, and materials related to the class.

In this study, the teaching method proposed was applied only to liberal arts classes, but it is expected that this will be extended to be used in adjacent fields. Future research projects are expected to continue to be suitable for the domestic educational environment by attempting technological approaches such as developing various contents and developing practical software programs based on the experimental teaching model for limited teaching and learning method.

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2019 4(2) 22-30 Submission: 2019/11/10, Peer review: 2019/11/20, Accepted: 2019/11/25, Published: 2019/12/30

Robotics & AI Ethics

Publication state: Japan
ISSN: 2435-3345

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http://dx.doi.org/10.22471/ai.2019.4.2.22

DNA Evidence: Beyond Reasonable Doubt?

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Abstract

This paper is a commentary about the importance and relevance of DNA in respect of the criminal justice system around the world, including Bangladesh. DNA evidence is considered to be one of the best types of evidence the 21st century has to offer. But how truthful is such a consideration? Is such evidence beyond reasonable doubt? This study closely examines the case of Josiah Sutton who was convicted of rape in 2000 after his DNA was found to be a direct match of the DNA evidence taken from the crime scene but was later released in 2004. The article therefore, questions the reliability of that very evidence found against him along with other factors that may contribute against the claim of DNA evidence being conclusive. It discusses both the pros and cons of DNA evidence and how relevant legislations in many countries are controlling such limitations or irregularities in their application of DNA evidence. All such information is crucial for making a comparative analysis with Bangladesh.

This paper mainly intends to provide a perspective of the existing DNA Act 2014 of Bangladesh by comparing its accomplishments as well as its shortcomings with countries who are utilizing this modern form of evidence to its best possible use, providing recommendations for the current legal application of DNA in Bangladesh.

[Keywords] ***DNA Evidence, Crime, Legislations, Limitations, Reasonable Doubt***.

1. Introduction

On October 25, 1998, Priscilla Stewart was abducted at gun point from the parking lot of her apartment by two men, who forced her into her vehicle and sexually assaulted her. One man wore a baseball cap with the bill turned to the side and the other man wore a skull cap. She was left so traumatized by the incident that she could not return to her apartment for a while. However, she eventually returns to collect her belongings and that is when she noticed three men walking on the street. One was wearing a baseball cap with the bill turned to the side and the other wearing a skull cap[1]. She immediately called the police which ultimately led to the men being arrested and their DNA samples were collected for testing. After the result from the laboratory reports, one of the two men was cleared while the other, Josiah Sutton was found to be a direct match to the DNA collected from the crime scene. Was Josiah Sutton guilty of committing rape to Ms. Stewart?

Before deciding the answer to this heavy accusation charged at Josiah, one needs to understand the very topic that is at discussion here, Josiah Sutton's DNA(deoxyribonucleic acid). What exactly is it and why is this so powerful in causing a court's judgment to be swayed towards conviction without any reasonable doubt?

2. Deoxyribonucleic Acid and Its Usage

DNA can be perceived as the "genetic blueprint" of a person since it contains the instructions for the development of certain characteristics like eye color or hair color which is unique to that individual. Human DNA contains 98% of non-coding gene that are useful for criminal investigations. Inside this particular gene, unique repeating patterns known as short-tandem repeat(STRs) can be measured to define the DNA profile of an individual[2]. It is these features that make DNA application a very powerful and reliable tool for the administration of the criminal justice system. Since these STR markers are produced in 13 different areas, they are used for comparison in analysis as the successful match of the unique markers to each individual is definite proof of such individuals' presence. While thousands of people may share several markers of their STR signature, no two individuals can possess the markers in exactly 13 areas(except identical twins).

DNA can be found in almost any cells of the human body including blood, sweat, saliva, semen or even dried skin. Therefore, whenever any of these things(even a miniscule particle of it) are carefully collected from a crime scene, a thorough analysis in the laboratory can lead directly to the person to whom the DNA rightfully belongs. For instance, in the case of Josiah Sutton, his DNA matched with the samples found in the car.

DNA fingerprinting or profiling or testing was pioneered by the British geneticist Alec Jefferys. Like every other important scientific discovery, he too found this process by accident[3]. When placed under a special gel, the DNA separates to different types of "bar codes" that are unique to each individual like finger prints. Thus, making it an excellent tool to compare with the DNAs collected from crime scenes and this is the reason why it can be argued that DNA evidence is one of the best types of evidence the 21st century has to offer. It helps in identifying the perpetrators of a crime, either known or unknown, directly from the crimes scene and similarly helps in exonerating the innocent. Since the Laboratory resources are limited, DNA analysis is usually conducted for the following types of offences:

a)Sexual assaults

b)Homicide

c)Missing or unidentified persons

There are still other valuable uses of DNA like parentage testing in determining the identity of the child's father and in discovering the genetic heritage of someone, i.e. who were their ancestors? Famous shows like *Finding Your Roots* or *Who Do You Think You Are* have popularized such use of DNA when celebrities took part in the show to discover information or identity about their ancestors. For instance, it was found that journalist Anderson Cooper's ancestors owned 12 slaves while actress Sally Field is related to the man who founded Massachusetts in the USA[4]. Such findings are of course not related to criminal investigations but it goes to show the gravity of information this microscopic piece of substance can provide.

DNA can be used in confirming whether or not the convicted accused did in fact commit the crime he or she was convicted of. The *Brewer* case demonstrates that DNA collected from a crime scene can prove actual innocence in cases even where other seemingly reliable evidence is substantial[5]. According to a study by the nonprofit organization *"The Innocence Project*," a total of 358 people has been exonerated till 2017[6]. Of the 358 successful exonerations in 155 cases the true perpetrator was identified via DNA testing. It was found during the time when these perpetrators were roaming free, they committed violent crimes including 80 sexual assaults, 35 murders, and 35 other violent crimes, while the innocent languished behind the bars[7]. Such numbers clearly highlight the importance of DNA evidence in proving or disproving a case successfully to catch the guilty offenders thus consequently preventing possible future offences.

Therefore, it is natural to perceive a report of

DNA match to be *prima facie* and conclusive proof of one's innocence or guilt since no other evidence in the world can provide the unique genetic code of the accused that puts him physically at the crime scene. In the case discussed earlier, only Josiah Sutton holds the genetic codes that make up his characteristics and thus the positive match of his DNA makes it incredibly likely that he was indeed one of the men who had sexually assaulted Ms. Stewart on that fateful night. That is the picture DNA fingerprinting paints but in truth, it's a common misconception. Despite being a powerful tool for criminal investigations of today's time, DNA profiling is fraught with many issues within its application and sadly the case Josiah Sutton is one of the many examples.

3. Issues of DNA Evidence

The first question regarding DNA evidence would inevitably be is whether it really is as infallible and unwavering as the science makes it to be? Should we rely upon it blindly? The answer is no. DNA Profiling or fingerprinting is nevertheless forensic evidence which is notoriously susceptible to contamination, tempering or manipulation. In a study conducted by the Innocence Project it was found that 45% of wrong convictions occur due to improper or unreliable forensic science[7]. This organization was founded by the members of the "dream team" from the infamous O.J Simpson trial, remembered for its controversial evidence contamination. The case goes as such: on June 12, 1994, Nicole Brown and Ronald Goldman were found brutally murdered in the back entrance of Nicole's Los Angeles home. The ex-football-star-turned-sports-announcer was accused of the gruesome murders. The trial drew a great deal attention from the American public with one question on everyone's mind - did O.J do it?[8] The case seemed easy from the start, from the matching glove found at Mr. Simpson's residence to the DNA found at the crime scene, every single piece of evidence directly linked him to the murder. However, the defense attacked the DNA evidence[9]. It was later found that the poorly packaged evidence was left in an overheated van causing far too many irregularities to take place. The whole evidence against Mr. Simpson was fraught with so many technical errors that it managed to cast a grim shadow of doubt on what was otherwise supposed to be a close and shut case for prosecution, without a doubt. This is just one of the well documented instances where poor management and handling of forensic evidence changed the direction of a trial and possibly resulted in injustice.

Furthermore, DNA is in fact a fragile substance that must be handled with extreme care and caution to prevent it from being infected or altered otherwise it can't be relied upon in a court of law. So, in what ways can DNA be contaminated or tempered or affected?

a)Undue care – This is a responsibility that the analysts must take when conducting their tests in the Laboratories or by anyone remotely involved with the handling of DNA.

b)Wrongful preservation – It's very important for the preservation of DNA that it be kept in optimum temperatures like cold temperatures. Keeping it in the sunlight or in high heat(as seen in the O.J Simpson's trial) can prove to be harmful.

c)Contamination – One of the biggest cause of DNA samples being damaged in the crime scene is when it gets interfered with others. Mere touch from one skin to another can lead to the transferring of DNA. The case of Jon Bennet Ramsey[10] is famous in this regard. The crime scene and body was so heavily contaminated, that it led the case to remain unsolved.

d)Misapplication – submitting the wrong analysis report by the analyst is not unlikely. Anything done manually will always leave room for errors.

Therefore, it is established that DNA can be majorly flawed if it is caused to be. Then is Josiah guilty of the accusation he's charged with due to the matching of his DNA? Josiah Sutton asserted that the error of misapplication had occurred in is his case. He submitted his DNA in belief that it

will prove him innocent but it led him to be convicted for a crime he did not commit. Despite his mother's protest, Josiah's possibility of innocence was ignored. The Houston Police department was under investigation which brought some shocking reports. The audit uncovered widespread problems at the lab ranging from potential evidence contamination to a lack of basic paperwork, and the department had suspended DNA testing[11].

William C. Thompson, a criminology professor at University of California later reviewed Josiah's DNA report. He heavily criticizing it, claimed it to be one of the worst he ever saw. He said in his report, "The fact that the laboratory obtained different profiles when typing samples from the same person raises profound concerns about the reliability of its procedures"[12]. Josiah Sutton was released from his charges four and half years after his conviction in 2004 with the help of the *Innocence project* and two local reporters. He had been sentenced for 25 years.

4. The DNA Act 2014 of Bangladesh with Other DNA Laws

4.1. DNA act of Bangladesh

DNA profiling or DNA fingerprinting is only as good as the records kept. DNA found in crime scenes are of no use if there is no other DNA for it to be compared with. Particularly in crimes where the suspect cannot be identified at all, but their DNA was left behind at the crime scene. In these circumstances, DNA analysis allows the perpetrators to be identified correctly by comparing it with the ones that are already stored in the DNA database. In 1995, Britain established the first national criminal DNA database[13] called *National DNA Database(NDNAD)* which was the largest of its kind. DNA of the arrested or missing would be stored in the database and it currently holds 5 million DNA profiles. Other countries soon followed it including USA, Canada and Australia to name a few, their databases were called, *Combined DNA Index System(CODIS)*, and *National Criminal Investigation DNA Database(NCIDD).*

Bangladesh soon followed in their footsteps and established a "National DNA database" under the DNA Act 2014 that aims at storing the DNA samples of the arrested, missing or found at crime scenes essentially needed in carrying out such investigations. This paper will later address the laws that exists in different countries in order to compare provisions with the existing provision of the Bangladesh legislation. Foreign laws including the following:

a)**Australia**–*Criminal Law(Forensic Procedures) Act 2007*– this Act specifically aims at providing the guideline in ways the DNA analysis should be carried out.

b)**United Kingdom** – *Protection of Freedom's Act 2012* – only clauses 1- 25 deal with provisions based on DNA handling.

c)**New Zealand**- *Criminal Investigations(Bodily Sample) Act 1995* – follows the same purpose as the Australian legislation.

On 22nd September of 2014, Bangladesh government passed the Deoxyribonucleic Acid(DNA) Act 2014. The Act provides provision of maximum 10 years' imprisonment and Taka five lakh fines for destroying, changing and tainting DNA samples(section 30) and maximum five years' jail and Taka three lakh fines for conducting illegal forensic DNA activities(section 28). It also has a provision of maximum three years' imprisonment and Taka 50,000 fine for collecting samples and publishing DNA related information illegally(section 29) and maximum two years' jail and Taka 30,000 fine for unauthorized access to the national DNA database[14].

Along with the establishment of the database and the various provisions briefly mentioned, the Act provides many other things that are certainly a positive push in making Bangladesh a technically advanced country with the correct mechanisms needed in punishing the guilty and saving the innocent. For instance the creation of the Advisory Council for the maintenance of the

Act, or the creation of the technical committee to monitor the correct application of the methods are important provisions for the maintenance of running this Act. Section 37 permitting the evidence to be admissible before the Court is crucial in allowing the DNA evidence to truly aid the cases in need. But the question is whether or not all that is enough?

In the USA, the FBI has created the *Quality Assurance Standards for Forensic DNA Testing Laboratories*, where many standards are laid down for quality results to be produced and maintained. This is to ensure that analysts' are kept up to date on who are actively employed at a crime laboratory[15]. STANDARD7 of the said document for instance, discusses the ways evidence needs to be controlled: "7.1.3 - The laboratory shall have and follow documented procedures designed to minimize loss, contamination, and/or deleterious change of evidence and work product in progress."

Such language and guidelines are one of the few key points that are missing in what could be an excellent legislation made for the betterment of the people in Bangladesh. Merely creating the Act alone is not sufficient if it lacks in features that are equally essential for a DNA-based law to run efficiently and fairly.

4.2. Characteristics of Bangladesh DNA Act

If the laws from foreign countries mentioned above are to be compared with the Bangladesh's *DNA Act 2014*, the following common major differences can be found.

4.2.1. Lack of procedural guideline

One of the most vital elements that needs to be considered when drafting any kinds of laws for the use and collection of DNA samples are the procedures. Taking of one's DNA is not a simple matter. It can't be treated the same way as merely taking a testimony of the victim or accused. DNA is a physical element that is taken directly from that individual's body thus it is an important and sensitive matter that requires guidelines and procedures to be followed correctly. Especially when it involves children and how they should be treated. And if they are to be collected from the crime scene then more rules and guidelines should be given on how to prevent it from being contaminated. Section 54A of the *Criminal Investigations(Bodily Sample) Act 1995* and the *Criminal Law(Forensic Procedures) Act 2007* is a whole Act that focuses on the procedure of handling and collecting DNA samples alone. Sadly Bangladesh is behind in creating these primary procedural guidelines. Section 15(f) of the *DNA Act 2014*does provide "follow the procedure prescribed by this Act and rules for DNA analysis conducted thereunder" however such "rules" or "procedure" are yet to be created "under this Act." It is at least hopeful that Bangladesh has considered the importance and is working towards in creating such rules and procedures in the near future.

4.2.2. Expungement of DNA

Clause 14 of Chapter 1 of the *Protection of Freedom's Act 2012* says the following:
"After section 63Q of the Police and Criminal Evidence Act 1984(for which see section 13) insert— **"**63R Destruction of samples (1)This section applies to samples—(a)taken from a person under any power conferred by this Part of this Act, or (b)taken by the police, with the consent of the person from whom they were taken, in connection with the investigation of an offence by the police." Additionally Sections 24Q, 26A and 45 of the *Criminal Investigations(Bodily Sample) Act 1995* deal with the "removal of certain DNA samples from the database." Section 60A of the said Act permits the DNA sample to be destroyed after its DNA profile has been made.

If all the mentioned foreign laws are observed, all provides some sections that are dedicated to the need of removing or destroying the DNA samples of the person involved after a certain period of time if acquitted or discharged from trial. Such countries are of the same opinion in

storage of unnecessary DNA of people with no intention of harm since this creates a debate of privacy. Is it ethical to keep the personal and sensitive information of a person when it's not relevant anymore? Major leading case in this regard is S and Marper v United Kingdom where the European Court of Human Rights found that it was in violation of Article 8 of the European Convention on Human Rights – the right to respect for private and family life[16]. Thus it ruled in favour of destroying the DNA taken from the plaintiffs who were found not guilty of the crime they were charged with. Unfortunately, such ideologies are not found in the Bangladesh legislation. Important topics like from whom it should be taken, consent, in case of refusal or establishment of database and technical committees are mentioned but no sections specifies for how long these DNA are to be kept in the laboratories. For how long should DNA's be kept for optimum preservation and results? UK allows 6 months until the stored DNA are to be destroyed, how long is the correct period of time in the opinion of Bangladesh?

4.2.3. Eligible offences

The interpretation clause of *Criminal Law(Forensic Procedures) Act 2007* provides a meaning to the "serious offences" that qualifies to be used for DNA application, "serious offence means— (a)an indictable offence; or (b)a summary offence that is punishable by imprisonment." Similarly, the *Protection of Freedom Act 2012*, provides provisions that directly combines the provisions from *The Police and Criminal Evidence Act 1984,* section 65A of the said Act provides the definition of qualifying offence which includes crimes of sexual or violent in nature. Such provisions are given to specify which kinds of offences qualifies for DNA testing to be done. In the Bangladesh legislation, *DNA Act 2014*, nothing is specified in terms of "offences" that are in need of this method. One could argue that leaving an open interpretation that allows any kind of offences to be eligible is something positive, but one has to remember that the process of DNA testing is no simple method. It is one of time and money.

Therefore, limited use of DNA fingerprinting will be better suited for a country that leaves a huge number of cases pending like Bangladesh. More than 3.3 million cases are now pending with the higher courts and lower courts across Bangladesh, according to the statistics placed by Law Minister Anisul Huq in parliament. Some 893,000 cases – 601,000 with lower courts and 292,000 with the higher courts – are pending for at least five years[17].

4.2.4. DNA before conviction

On 31st August 2003, Katie Sepich's parents received a phone call that changed their lives forever. Their young daughter was brutally raped, strangled to death, set on fire and abandoned at a dumpsite near her home. No suspects can immerge from such cases but the skin and blood found from Katie's fingernails were inserted in the CODIS. Three years later the DNA matched with a man named Gabriel Avila who was found to be convicted for other criminal offences. Had there been a law that demanded Avila's DNA sample as soon as he was arrested earlier in 2003, Katie's murderer would have been caught much sooner than he was[18]. Thus Katie's law was passed by the New Mexico State in the USA naming the legislature as the *Katie Sepich Enhanced DNA collection Act 2010*[19]. Her parents are now strong advocates of the law that is aimed at preventing crimes and saving lives by taking the DNA samples of the offenders as soon as they are arrested. 25 states in the US have passed Katie's law. Then later, similar tragedy had occurred again in 2007, Nevada, for a college student named Brianna Dennison and Briana's law was enacted in Nevada for the same purpose[20]. This type of law has been commonly named as Arrestee DNA law. Its reflection can be seen in other foreign laws including the *Protection of Freedom's Act 2012* of UK which holds sections like 3 and 4 that provide taking of DNA samples from "persons arrested for or charged with a qualifying offence or a minor offence."

In comparison, Bangladesh legislation did not specify any such sections for the taking of DNA samples from the arrested. Section 24 of the said Act provides the types of DNA profile that should be collected which includes:

a)Crime scene index
b)Convicted offenders index
c)Missing person index
d)*Such other index as may be determined by the Government* from time to time

Even though clear and specific provision was not made for arrestee DNA law, sub-section (d)however, provided a scope for the law to be extended in the future if the Government deems it fit. Additionally, eight states including Alabama, Arizona and Wisconsin have inserted provisions for juveniles for the arrestee DNA law. Such States have recognised the importance of keeping laws to monitor a large portion of crimes that occur due to teenagers. However, no such mention for juvenile crimes or any crimes for that matter are present in the Bangladesh legislation. Though section 4, 6 and 9 of the said Act have inserted the word "minor" but that does not specify enough in what age range it wants the word to be associated with since the age of a minor is a debatable topic in Bangladesh for having various definitions in various laws.

Comparatively, with laws like Criminal Law(Forensic Procedures) Act 2007 and Criminal Investigations(Bodily Sample) Act 1995, the DNA Act 2014 of Bangladesh is a fairly small legislation with only 41 sections. And within those 41 sections all types of information are discussed from the creation of databases, advisory councils and the offences that are capable out of violation from this Act alone. More or less it provides an introduction to all the essential topics needed in a legislation yet it feels empty in many areas that are vital in a DNA-based legislation. It lacks heavily in areas that are fundamentally crucial, like the lack of procedural guidelines, instructions for the acquitted and the period of keeping the DNA samples. Also the fact that, no accreditation board exists in Bangladesh to verify the reliability of the evidence and DNA tests conducted by DNA profiling laboratory in Dhaka Medical College is a huge drawback. In the USA, crime laboratories are required to achieve accreditation to verify that it meets quality standards through accrediting organizations like *The American Society of Crime Laboratory Directors Laboratory Accreditation Board* and the *National Accreditation Board*[21].

5. Commendable Effort but Room for Improvement

Other than the differences mentioned, the legislation enacted by Bangladesh is an excellent start in applying the most technically advancement evidential method the world currently provides. The Act still manages to grasp all the essential elements needed in a good legislation. It is a commendable effort for Bangladesh where many countries like India are yet to apply it. It is unfortunate that cases like Josiah can happen but it is a fact that DNA fingerprinting will bear more positives than the negatives due to opening of many doors for the forensic world and for the criminal justice administration to explore in. It now allows the innocent to taste freedom and the actual perpetrators to be caught providing less chance of murders, sexual assaults or injuries in any way. Bangladesh too will to be seeing the effective benefits of DNA fingerprinting if the legislation and its procedures are used in the correct way. Eventually DNA samples will not be needed to be sent abroad for analysis as was done for the case of Avjit Roy[22]. Bangladesh has begun to collect all the tools and necessary elements needed in running a law that can prove to make an actual difference.

To answer the question of this paper, conclusive evidence means that it is proved to the extent that nothing can rebut it however many possible errors can come to exist when handling DNA materials, thus causing it to be certainly inconclusive in nature. The question is whether DNA evidence is reliable and conclusive? In the case of Josiah, it could not be relied upon. But if

the issues of DNA alteration mentioned above were to be controlled or even removed, can DNA evidence be then argued to be reliable? Can it be argued to be the best evidence for a case?

It is important to remember that the first application of this method was in 1986 and it begun by exonerating an innocent man named Richard Buckland. He was pressured by the authorities in confessing to the rapes and murders he did not commit. DNA fingerprinting proved him to be innocent while finding the real perpetrator, Colin Pitchfork, to be guilty[23]. Yes there are flaws to this method, but what doesn't contain a flaw? Does perfection even exist? If it does, it can only arise after realising and identifying the mistakes for correction.

6. Conclusion

DNA evidence cannot be a conclusive evidence but it certainly provides stronger information than any other kinds of evidence. Amendments are vital for striving excellence. Cases like Katie and Brianna will arise for changes to happen. What's important is for those changes to be understood and applied correctly. That is the mentality Bangladesh needs to go through too. The enactment of the *DNA Act 2014* is certainly the first step required in walking along side with the countries that are proving DNA fingerprinting to be effective beyond a reasonable doubt. Now the question will be, how much can DNA fingerprinting contribute to Bangladesh?

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