A Study on Theological Students’ Perception of Artificial Intelligence and the Christian Educational Implications*

Jun-Sub Im
(Senior Researcher, Sarang Education Institute in Sarang Church)
biosub1020@gmail.com

Young-Ju Ham
(Assistant Professor, Chongshin University)
yjham@chongshin.ac.kr

Abstract

Rapidly developing modern science & technology have a profound impact on Christians and pastoral work. Recently, the 4th Industrial Revolution has induced lots of discussions in the field of church and theology, and artificial intelligence (AI) has become an important issue in many ways. Nevertheless, there is a lack of empirical research on how the AI would affect church and pastoral work. This study examined and analyzed the theological students’ perception of AI. A survey was conducted on the perception of seven sub-areas of 220 male and female theological students at major seminaries in Korea. The seven sub-areas were including the degree of interest in AI, social influence, AI’s alternative influence, and AI’s church influence. The results showed that theological students generally agree with the academic relevance of AI

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or the need for education on AI. However, it presented a low perception of the impact of AI on the church. Such recognition may reflect the following belief. Students are aware that the AI is a necessary and important part of social and general education, but at the same time, they think the AI may not significantly threaten the church. Therefore, we suggest that considering a response of Christian education to raise the perception of theological students of AI, courses related to science and technology should be organized in the curriculum of seminaries at various levels from the perspective of the Christian worldview.

Keywords


I. Introduction

All education depend on understanding of human beings, and Christian education clearly differs from general education in human relations with God. With the brilliant development of science and technology, the understanding of human beings has been changing. There are many things that are likely to come out of science fiction films in the past, and we do not feel unfamiliar with robots on behalf of humans. It has been a long time since cyborg robots have taken care of human children, and automatic vacuum cleaners have been running around the house. Pre-orders of flying cars have been launched, and some humans appear to be frozen and came in capsules dreaming of eternal life.
Rapidly advanced science and technology have transformed human-like robots, which were considered as potentiality in dwelled in all mankind, into reality that have now been realized (Park, 2018). Now, it became a common noun, the artificial intelligence (AI). In the past, the AI was merely a cumulative array of mathematical algorithms; however, it reached the level of what is now known as deep learning and beat chess world champions in 1997. Consequently, AI could achieve the overwhelming victory against the Go world champion, which was in conceivable before. In 2016, AlphaGo, AI developed by Google, and Se-dol Lee, one of the world’s best Go Knights, played five games in the name of the Google Deepmind Challenge match. AI beat Lee with 4 wins and 1 loss. Later, in May 2017, Ke Jie, the world’s No. 1 player at the time, also lost all three games to Alphago. Recently, the AlphaZero system has been introduced in the journal, *Science*, which allows to upgrade its learning skills for itself beyond the Alpha Go. It could be said that the AI has already surpassed humans in the acquisition and processing of simple knowledge and information. A fantasy has become a reality.

The emergence and development of the AI gave rise to a number of philosophical and ethical problems that human beings have not considered before. Could AI think or make decision? Does AI have emotions? Should human rights be given to AI? Could the crime of the AI get criminal punishment? At what field and in which level would AI replace human occupation? Would AI threaten humanity and eventually replace it? beyond the question of whether we can answer many of these questions, when the situation that
must be answered appears sooner than expected, the most urgent problem for Christians comes from defining of the relationship between AI and faith. Can soul exist in AI? Can AI be the object of salvation? Can AI preach? Can we use AI in pastoral and church education? If so, in which degree could it be extended? Recently, with the issue of the 4th Industrial Revolution and the increasing debate about AI, the concerns about these issues get deeper and deeper. But what about pastors who have to be aware of and deal with these problems at the ultimate level in the ministry? In particular, how are the theological students preparing for the age of AI? Who become a pillar of the ministry within the next few years or decades? When it will be even more powerful than the present? Or above all, how much do they know about the AI and do they know it properly? This study began with a critical mind on these points and aimed to: First, the concept and history of the AI, and its theological and philosophical understanding we reexamined in terms of ontology in particular, and the educational meaning, including Christian education. This would be a background to sort out important questions related to AI and to examine how the theological students to be investigated later. Second, we conducted a survey regarding the perception for AI of theological students, who are currently studying Christian theology. This survey included a general interest and understanding of AI, relationships with education, and perception of church pastoral and education relationships. Lastly, based on the results of theological students’ perception of AI, we could consider with more depth from a Christian educational perspective.
II. Background

1. The concept and development of the AI

The AI refers to artificial intelligence made by humans in simple terms. In the Korean National Standard Institute’s standard dictionary, ‘artificial intelligence’ is a vocabulary equivalent to a computer, which is defined as ‘a computer system with functions such as learning, reasoning, adaptation, and argumentation of human intelligence’ (National Institute of Standards and Encyclopedia online: http://stdweb2.korean.go.kr/). On the other hand, the English version of Britannica Encyclopedia defines it as ‘the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings’ (English version of Britannica Encyclopedia online: https://www.britannica.com). In practice, however, it refers to a program that emulates some of the features of human intelligence in logical formulas, or a machine that mounts the program on a physical machine. The term, ‘artificial intelligence’, was first coined in the mid-1950s by an American computer scientist, Allen Newell and an economist and physicist, Herbert Simon, and it was called GOFAI (Good Old-Fashioned Artificial Intelligence) (Lee, 1994). But the conceptual history, in other words the concept of intelligent machines, was introduced in a paper published by Allan Turing in 1950 entitled ‘Computing Machinery and Intelligence’. “Can machine think?” was the first question of Turing. ‘Ability to think’ means intelligence. Turing insisted that through a so-called ‘image game’
(commonly known as the Turing test), if it is difficult for the machine to be cognitively distinguished from human communication using the symbolic language, we can say that the machine can also think.

From the mid-1950s when the concept of artificial intelligence was born, the development of AI has been divided into three stages according to its research and development (Heo et. al., 2017). The first step was counted from the introduction of AI at the Dartmouth Conference in 1956, until the mid-1970s when computer programs could solve structured problems through complex mathematical and logical calculations. Turing machines and chess games were the epitomes. However, the calculating power of computers alone has reached the limit that it cannot solve the more complex and multi-layered problems of human life, and related research has withered.

The second stage, from the 1980s to the early 1990s, originated from the input of more complex information and knowledge into the computer rather than from simple calculations. By inputting and accumulating enough specialized information and knowledge in a specific field, such as medical or legal fields, you can solve complex problems related to that field. Therefore, at that time, AI of expert models specialized in more specialized fields was developed, and ‘MYCIN’, a medical AI system representatively developed by Stanford University. MYCIN has sufficient medical knowledge and has a system for diagnosing and prescribing medical patients' illnesses. However, it also had limitations in determining more complex everyday situations using a lot of information and knowledge acquired and stored in the uni-
versal daily life of human beings, not in specialized fields.

The final third stage is from the mid-2000s to the present. The AI, as the icon representing the so-called 4th Industrial Revolution era, is the representative technology that leads the change of the times. The explosive storage capacity of information that is different from conventional computer systems is called 'big data', and goes beyond simple information storage capability to 'deed-learning' program that learns for itself. It is. In particular, through the convergence of life sciences, it has been able to mimic the neural network of human beings, and AI has the ability to perceive, identify, judge, and predict objects. Google's Alpha-Go and IBM's WATSON are representative, and convergence research in computer science as well as cognitive psychology, neurophysiology, and mechanical engineering is being actively conducted to realize non-material elements such as human mind and emotion.

2. AI and education

The relationship between AI and education, or learning and teaching, is very close to the historical context of AI itself. Since Alan Turing, who first proposed AI in 1950, introduced a ‘learning machine’ that can be learned by program, there was also a bright outlook on AI as well as its positive relationship with education. Contrary to early expectations, research on AI has been somewhat faltering as confronted with the limitations of solving the complex life problems of human life. However, in the 1980s, the so-called AI secondary boom, investment in AI became ac-
tive again, and ‘Intelligent tutoring systems’ specialized in education were also developed. Representative items introduced during this period include BUGGY & DEBUGGY, a student’s knowledge diagnosis program, and PROUST developed by Yale University (Heo et al., 2017). Yet the limitation of still having to enter more information and knowledge to solve more complex problems was an obstacle to the development of AI. Finally, realizing that the biggest difference between AI and human intelligence lies in ‘learning ability,’ researchers turn to the ‘learning machine’ that Turing originally proposed. It is to develop a program for self-learning based on ‘artificial neural network’ that mimics the neural network that human intelligence can learn. This has led to the development of the third AI, which is the ‘deep-learning.’ Deep-learning enabled not only simple mechanical learning, but also ‘representational learning’ that can identify, determine, and predict a given phenomenon (Heo et al., 2017). There are three types of machine learning: supervised learning that simply enters given information, unsupervised learning that the computer learns itself, and reinforcement learning that rewards learners’ learning outcomes. Deep learning is possible with all three machine learning methods. This means that it could analyze what the information that is physically received means to humans, and the resulting specific behavior can be predicted and implemented. Heo and others claim that AI technology itself is the product of an effort to capture the characteristics of human intelligence in a non-human machine, suggesting that the educational characteristics of human intelligence have been an important theme in the development of AI (Heo et al., 2017).
In the relationship between AI and education, general education research has been particularly active in terms of teaching methods, and has a role as a major driver of AI development (Heo et. al., 2017). The subject of recent discussion is largely the teaching method of strong-AI, and in particular, there is a debate about AI which completely replaces the role of the existing ‘teacher’ in the traditional teaching pattern of instructor-learners. Unlike general education, however, there are relatively few domestic studies on AI and Christian education. Only 75 papers were searched for ‘artificial intelligence’ and ‘Christianity’ by the Korea Education & Research Information Service (Search at March 5, 2020: www.riss.kr). Only few papers were directly or indirectly related to education (Kim, 2014; Cho, 2016; Kim, 2017; Kim, 2017; Kim, 2017; Kim, 2018; Yang, 2018; Yoon, 2018; Go, 2018; Lim, 2018; Yang, 2018; Kim, 2019; Yoo, 2019; Kim, 2019; Song, 2019).

In the pastoral field, especially next-generation ministry is so closely tied to education. Therefore, an integrated understanding of pastoral ministry, education, and AI is indispensable for the next generation of pastors. For pastors dealing with the invisible spiritual world, not just the visible material world, it is clear that the issue of AI is a very spiritually sensitive, and their perception and sensitivity are needed to be strengthened (Kim, 2017). What do candidates for pastors who are the center of the next generation of Korean churches think about AI and education? Unfortunately, we could not find any research that examined theological student’s perceptions for AI in pastoral field including Christian education. However, only two researches on the
recognition of AI of elementary school teachers and the recognition of AI of university learners were found in general education. In short, in the general education as well as the Christian education, the general research for the perception to AI is very lacking and there is an urgent need for it. As it seems certain that AI will have an influential impact across the church and the educational community, there is a strong need for pastoral candidates to be sensitive to it and for background research.

III. Research Method

1. Research subject

This study examined theological students’ perception of AI. The subjects of this study were male and female seminary students who were attending the theological seminaries or theological college school in Korea. In the current study, students in seven specific theological seminaries or colleges (A–G) were surveyed. In addition, some students in other theological seminaries were also participated in this survey. A total of 220 students who participated in the survey were analyzed according to gender, school level, ministry department in church and school.

(Table 1) Demographic Analysis

<table>
<thead>
<tr>
<th>variable</th>
<th>classification</th>
<th>frequency</th>
<th>valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td>male</td>
<td>146</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>73</td>
<td>33.3</td>
</tr>
</tbody>
</table>
2. Research questionnaire

The questionnaire used in this study was supplemented to some of the thesis by Ryu and Han(2018), who surveyed the educational perception of AI among elementary school teachers. In the study, the authors used questionnaires to measure interest in artificial intelligence, relevance to curriculum, knowledge of artificial intelligence, positive aspects of artificial intelligence, and negative aspects of artificial intelligence. In this study, the questionnaire was produced using this prior study and additional questions related to Christian education were inserted. A total of 33 questions
were developed for each of the first 11 subsections, but 21 questions were used for the analysis in 7 subsections, except for 4 subsections that were not available for the reliability test. Each item was measured on a 5-point Likert scale (strong agreement = 5, agreement = 4, moderate = 3, disagreement = 2, strong disagreement = 1).

There are seven sub-areas of the questionnaire used in this study. The degree of interest in AI represents the degree of interest in AI itself and the degree of interest or curiosity about key technologies and information. Social influence represents the degree of recognition that AI will affect human economic activities, arts, and politics. AI negativity is the recognition that AI would replace and threaten humanity and human occupation. Academic relevance is a perception of whether AI is related to science and mathematics. Substitution impact is a perception of whether AI will replace teachers, textbooks, or existing education. The necessity of AI education is the recognition of the justification and hope for the education of AI. AI church influence is a perception of whether AI affects churches, pastors, etc. When each question is composed of 3 questions by sub area, the reliability is as shown in the following table.

(Table 2) Reliabilities of Questionnaires

<table>
<thead>
<tr>
<th>Variable</th>
<th>explanation</th>
<th>questions</th>
<th>reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of interest</td>
<td>Degree of interest in AI</td>
<td>3</td>
<td>.794</td>
</tr>
<tr>
<td>Social influence</td>
<td>Impact on the economy, arts, politics</td>
<td>3</td>
<td>.648</td>
</tr>
<tr>
<td>AI negativity</td>
<td>AI’s substitution of humanity and Job, and its threat</td>
<td>3</td>
<td>.619</td>
</tr>
</tbody>
</table>
IV. Result and Analysis

1. Mean and standard deviation for variables

The highest average score for theological students’ understanding of AI was 4.234 in terms of academic relevance. In other words, they have high perception in that AI is related to science and mathematics. Subsequently, theological students scored 3.728 points on the perception that education for AI was necessary. Theological students seem to have responded positively to the necessity of education about AI. Theological students also gave an average of 3.68 points to the category that AI will affect key areas of society, including economics, arts, and politics. However, the impact of AI on the church was 3.04, which was relatively low compared to the other areas. This seems to reflect the perception that AI is a necessary and important part of social and general education, but it does not seem to develop a pastoral position or threaten the church.
2. Group differences in major variables for AI

Turned up in a result of examining the differences among the sub-groups on AI per gender, the average score of male students was significantly higher than that of female students on the items that degree of interest in AI and AI would affect the church (p < .05).

Table 3: Descriptive Statistics for Subscales

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of interest</td>
<td>220</td>
<td>3.3576</td>
<td>1.00552</td>
</tr>
<tr>
<td>Social influence</td>
<td>220</td>
<td>3.6803</td>
<td>.85731</td>
</tr>
<tr>
<td>AI negativity</td>
<td>220</td>
<td>3.2424</td>
<td>.88497</td>
</tr>
<tr>
<td>Academic relevance</td>
<td>220</td>
<td>4.2348</td>
<td>.72981</td>
</tr>
<tr>
<td>Substitution impact</td>
<td>220</td>
<td>3.2712</td>
<td>.97231</td>
</tr>
<tr>
<td>The necessity of AI education</td>
<td>220</td>
<td>3.7288</td>
<td>.89231</td>
</tr>
<tr>
<td>AI church influence</td>
<td>220</td>
<td>3.0409</td>
<td>1.00926</td>
</tr>
</tbody>
</table>

Table 4: Perception of AI by Gender

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>average</th>
<th>SD</th>
<th>t-test for equality of means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of interest</td>
<td></td>
<td></td>
<td></td>
<td>t</td>
</tr>
<tr>
<td>Equal variances</td>
<td>2.202</td>
<td>217</td>
<td>.029</td>
<td>.31507</td>
</tr>
<tr>
<td>assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances</td>
<td>2.214</td>
<td>146.116</td>
<td>.028</td>
<td>.31507</td>
</tr>
<tr>
<td>are not assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AI church influence</td>
<td></td>
<td></td>
<td></td>
<td>t</td>
</tr>
<tr>
<td>Equal variances</td>
<td>2.485</td>
<td>217</td>
<td>.014</td>
<td>.35616</td>
</tr>
<tr>
<td>are assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
One-way ANOVA was performed to examine the differences among the sub-groups in the perception level according to school. As a result of the analysis, there was a difference between groups in academic relevance, the necessity of AI education, and AI church influence. Among them, for the necessity of AI education, the students in B school showed higher average scores in the statistically significant level compared to the students in C school (p < .05).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean squared</th>
<th>fault</th>
<th>P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic relevance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inter-group</td>
<td>9.673</td>
<td>7</td>
<td>1.382</td>
<td>2.734</td>
<td>.010</td>
</tr>
<tr>
<td>in-group</td>
<td>106.647</td>
<td>211</td>
<td>.505</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>116.320</td>
<td>218</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>The necessity of AI education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inter-group</td>
<td>18.331</td>
<td>7</td>
<td>2.619</td>
<td>3.553</td>
<td>.001</td>
</tr>
<tr>
<td>in-group</td>
<td>155.509</td>
<td>211</td>
<td>.737</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>173.840</td>
<td>218</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AI church influence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inter-group</td>
<td>17.672</td>
<td>7</td>
<td>2.525</td>
<td>2.593</td>
<td>.014</td>
</tr>
<tr>
<td>in-group</td>
<td>205.403</td>
<td>211</td>
<td>.973</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>223.075</td>
<td>218</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Independent sample t-test was performed to examine the differences among the groups in the sub-perception level according to school level. As a result, students of the theological seminaries showed higher average scores in the stat-
istically significant level than the theological college students (p < .05). In other words, seminary students consider it more serious that AI threats to the pastoral position and the church.

(Table 6) Perception of AI by School Level

<table>
<thead>
<tr>
<th>AI church influence</th>
<th>t-test for equality of means</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T</td>
<td>degree of freedom</td>
</tr>
<tr>
<td>Equal variances are assumed</td>
<td>2.007</td>
<td>218</td>
</tr>
<tr>
<td>Equal variances are not assumed</td>
<td>2.007</td>
<td>217.721</td>
</tr>
</tbody>
</table>

3. Sub-factors on church influence of AI

Multiple regression analysis was conducted to investigate the factors that affect the church influence of AI. According to the analysis, the recognition that AI would replace teachers and textbooks had the biggest influence, and since then, the social impact on AI’s negativity of humanity, job substitution and threat, economy, art, and politics. In other words, it is recognized that the educational and social influence on AI would consequently affect church and church education.

(Table 7) Regression Table of AI Church Influence 1

<table>
<thead>
<tr>
<th>model</th>
<th>R</th>
<th>R squared</th>
<th>fixed R squared</th>
<th>Standard Error of Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.560</td>
<td>.314</td>
<td>.310</td>
<td>.83812</td>
</tr>
</tbody>
</table>
V. Christian Educational Implications

1. Preparing perception for the Impact of AI to church education

The most striking result in this study was the perception of the church’s influence of AI on the theological students. Theological students underestimated the impact that AI would have on the church compared to other areas (3.04). Even if AI would be developed, it is considered that it
would not affect the church or the pastoral much. On the other hand, it is interesting that the impact of AI on society as a whole is much higher (3.68), which is similar to that of general education. The field ministry of church is inex-tricably linked with the social trend in which the Christians live. The impact of AI on society as a whole indicates that it will not have a small impact on the daily lives of the Christians. Oh recognizes that the 4th Industrial Revolution, including AI, will bring about a great change in the pastoral field. He points out that the pastoral response to the psychological sensitivities caused by the degeneration of philosophical thinking and empathy for immortal humans is urgently needed. In this area, Oh pays attention to the “digital minority,” which has relatively low technological power and grip in the age of rapid development of advanced convergence science such as AI. Digital literacy education for them is practically needed. In this part, practical response of the church field is also required, and social service linked with professional institutions is suggested as an alternative. This study also showed that substitution and social influences were correlated with church education influences. It is clear from this that AI would have an impact on the pastoral work of the church, including church education. Nevertheless, it is a concern that theological students, that is prospective pastors, do not take the AI influence seriously. To address these concerns, various educational responses, including seminary education, will be required.

1. Educational response to prospective pastors’ perception of AI
After all, there is no doubt that AI would have a significant impact on society. However, in this study, the general perception of AI of theological students did not exceed 4.0. So far, theological students are not very aware of the impact of AI. It is fortunate, of course, that the seminary students scored higher on the perception that AI had the impact on church education than theological college students. This is because the seminary student, who will soon be going to the pastoral field, shows that the sense of pastoral closeness to the practical society is more realistic. Nevertheless, the overall degree of perception is still low. However, the development of technology due to the 4th Industrial Revolution is expected to be accelerated in the future, and it is necessary to be aware of AI and prepare for education in this era.

In this context, what should be done in Christian education? First, critical thinking of theological students should be developed based on the theological foundation on the advancement and influence of scientific civilization including AI. The Christian worldview approach is required, and the capacity to deal with the many theological and philosophical issues caused by AI must be developed (Lee, 2018). It is natural that education for such approach needs to be properly reflected in the new curriculum of the seminary. In particular, our study found that science and mathematics were mentioned as highly related to AI, and the theological students also showed a high level of agreement on their relationship. Some space for academic dialects in relation to modern science should be adequately included in the traditional fence of theology that have been established. To date, however, it
is difficult to find a concrete reflection of this in the curriculum of front-line seminaries that train prospective pastors. In particular, some domestic theological seminaries advocating reformed theology with a clear theological background for general revelation will have to deal with science and mathematics, which are the fields of general revelation, more soundly on the basis of reformed theology.

Second, training programs for pastors who are currently in the ministry should be established. Teaching for pastors should not be stopped, rather it should be extended to lifelong learning. As times change rapidly, education that reinforces Christian values for pastors should be considered. Oh argues that the 4\textsuperscript{th} industrial revolution, represented by AI, will be marked by changes in the labor concept and the human cloud-based system of the global economy. Therefore, it is necessary to re-establish the basis of Christian theology and philosophy on the fundamental existence of human beings with Christian values that fit the trend of the times. Educational age for the formation of value is much earlier than undergraduate or graduate courses. Furthermore, according to the rapidly changing period of time, appropriate age of education of value is required for the age group after the adulthood. Therefore, a consistent and balanced lifelong education system from elementary school and Sunday school education to adult education centered on Christian colleges should be strengthened. In this view, the reconsidered issue is the reeducating program of pastors who are already working in the field. The pastoral and educational capacities of stagnant pastors who have not kept up with changes in the field of ministry still remaining in Jerusalem
must be extended beyond Jerusalem to recognize and capture a hyper-connected society.

Third, the negative impact of AI on Christian education should not be overlooked, and the positive side of AI also should not be ignored. According to a 2016 World Economic Forum report, convergence technologies such as AI, mobile internet, cloud technology, and big data are the drivers of change in economic and social activities. This suggests an important positive driver of the Christian educational use of AI. In fact, a broad range of AI, that is, weak-AI, is applied in almost all technical fields, and would be further expanded. The same holds true for education. Kim (2014) proposed an AI-based convergence environment-based education system that replaces the traditional Christian education system in the age of AI. Kim and Ham (2015) also suggest various church education methods using internet-based multimedia, insisting on the introduction of e-learning or smart learning. It says that media literacy education should be done. Although the vague boundaries between positive and negative still seem burdensome, the positive role of AI in future Christian education and the church is difficult to gauge how much it is used.

3. Practical measures to raise perception of AI

This study shows that theological students have a relatively low perception on the premise that the future of the church and the influence of AI on Christian education are significant. What are some practical ways to raise perception of theological students for AI? As discussed above, we
do suggest as much as possible educational response to AI in various aspects. Let’s consider more specific approaches.

First, the curriculum of Christian colleges, such as the graduate seminaries as well as the undergraduate colleges, has to contain subjects and programs that can build a fundamental knowledge of various disciplines related to AI such as science and mathematics. This study shows that there are differences between schools in the perception of theological students. Significant differences between schools can be attributed to the school’s elaborate curriculum and other programs. For example, Ryu and Han pointed out that software education and coding education for front-line elementary school teachers not only raises perception of AI but also needs those educational programs.

Second, more practical research about AI or exchange and convergence of related science and technology in the field of Christian education should be promoted for practical programs. The various foundational sciences related to AI are still summarized in the humanistic premise of secular science. Therefore, theological or Christian pedagogical work that criticizes through the Christian worldview and dialectically filters it should be preceded. There is also a need to broaden the field of academic communication through friendly partnerships with theology and Christian pedagogy, as well as other disciplines such as science and mathematics. To this end, various seminaries should expand the curriculum and research cooperation courses on other academic disciplines such as science and mathematics, which are the core foundations of modern and future society such as AI.

Lastly, our study indirectly presents the dynamic relation-
ship between theological students as the prospective pastors and AI, or Christian education and church field. In other words, the cognitive correlation between the theological students and AI in this study is related to the whole church education. For example, in the study of the perception of church education by all the subjects in the field of church education, such as pastor, associate pastor, and teacher, Ham (2015) was concerned the decline of church education in contemporary Korean churches and pointed that the cause was a problem of the very comprehensive total system. He actually worried that this problem is not just ‘one’ church problem. The background is the negative perception of Christianity, the rejection of Christianity itself, and the challenges of overall world culture to Christian culture. Therefore, at least, as pointed out above, denominations that advocate reformed theology should take a denominational approach. This is because the theological and philosophical basis of Christian education differs according to various theological backgrounds of different denominations. Therefore, the various Christian educational responses proposed in this study require a very comprehensive and inclusive approach such as denominations.

VI. Conclusion

In view of the future of the Korean church, which has been remarkably declining in recent years, the sense of crisis about Christian education is great, but the responsibility for Christian education is growing. The crisis of Christian
education that secures the future of the Korean church can be found in the proper fusion of Christian spirituality with a fusion technology society such as AI based on highly developed scientific civilization (Kim, 2014). As the most popular technique of modern science, the development of AI would be revolutionary. Nevertheless, AI has its fundamental limitations, and ultimately, the fallen origins of human beings who created AI and the limitations of their essential existence can only lead to conflict. However, it is clear that the development of AI will have no little impact on the pastoral field of the future church. Therefore, the virtues that the theological student, a prospective pastor who will soon go to the field, must have are the understanding of the times and the church situation, and the Christian educational literacy for the future Korean church. It is important for theological students to understand how Christian education, pastoral change, and AI will cause a strong transitional change in general education and society as a whole. In this regard, this study leads to the following conclusions.

First, the perception of the impact of AI on church education was low. Considering the various discussions and predictions about AI in the field, an educational response is strongly needed to raise perception. Second, as a response to Christian educational practice related to AI, curriculum of related subjects for Christian worldview education and lifelong education should be included in seminary both the undergraduate and the graduate, and interdisciplinary research, which is particularly practical, must be expanded for education. Third, a critical approach is required to maximize the positive impact that AI can bring to Christian ed-
ucation, along with effective and practical responses to counteract the negative impact of AI. For this purpose, a study of the theological and philosophical background of Christian education should be preempted. Fourth, in order to respond to the ideological challenges underlying the ideology of modern science and technology, such as AI, a strategic approach is required at least at the denomination level, not at the individual seminary or local church level.

Finally, suggestions of this research on the impact of AI on Christian education are as follows. First, it is the aspect of Christian worldview education on how to understand AI by connecting with the relationship between the Fourth industrial revolution and Christianity. As pointed out earlier, the fundamental approach to AI must be at the level of a Christian worldview based on the reformed theology. Based on ontological anthropology, we should critically study the scientific ideas of AI. The other is about the degree and extent of utilization of science and technology, including AI, in teaching methods. In general education, the acceptance criteria of AI are much more inclusive than the Christian education. Therefore, in theological and philosophical terms, the introduction of various technologies related to AI is very active in terms of educational method. Even with critical theological and philosophical introductions, relevant organizations and institutions would have to work to ensure that the applicable technologies are made as soon as possible.
Bibliography


Silver, D., Hubert, T., Schrittwieser, J., Antonoglou, I., Lai, M., Guez, A., Lanctot, M., Sifre, L., Kumaran, D., Graepel, T., Lillicrap,


The english version of britannica encyclopedia online. Search with ‘artificial-intelligence’ on November 9, 2018, Retrieved from https://www.britannica.com/

The national institute of standards encyclopedia online. Search with ‘인공지능’ on November 9, 2018, Retrieved from https://stdweb2.korean.go.kr/
인공지능에 대한 신학생들의 인식 연구와
기독교교육학적 의의

임준섭(사랑의교회 교육연구소/선임연구원)
함영주(충신대학교/조교수)

현대 과학 기술의 급속한 발전은 그리스도인과 목회 현장에 지대한 영향을 미치고 있다. 최근 대두된 제4차 산업 혁명은 교회와 신학 분야에서 다양한 토론을 이끌어 내고 있으며, 특히 인공 지능(AI)은 각계각층에서 중요한 이슈가 되고 있다. 그럼에도 불구하고, AI가 어떻게 교회와 목회 현장에 영향을 미치는지에 대한 연구는 부족한 실정이다. 이에 본 연구진은 신학생들의 AI에 대한 인식도를 조사하고 분석한 후, 그에 대한 기독교교육적 의의를 고찰했다.

본 연구 결과로 신학생들은 AI의 학문적 관련성 또는 AI 교육의 필요성에는 일반적으로 동의하고 있으며, 교회에 대한 AI의 영향력에 대해서는 상대적으로 낮은 인식도를 보였다. 이같이 낮은 인식도는 신학생들이 AI가 일반 사회나 교육에는 필수적이고 중요한 부분이라고 인식하지만, 반면 AI가 교회를 크게 위협하거나 지대한 영향을 주지는 않을 것이라는 그들의 신념을 나타낸다. 이에 대해서 우리는 AI에 대한 신학생들의 인식도를 높이기 위한 기독교교육적대응이 있어야 한다고 생각하며, 기독교세계관의 관점에서 과학 기술과 관련된 교육프로그램을 신학교의 교과 과정에 여러 수준으로 마련할 것을 제안한다.
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