

# Analysis of the impact of artificial intelligence on college students and countermeasures based on the perspective of comprehensive development

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**Abstract:** *In order to investigate the various impact of artificial intelligence on college students, this paper analyzed 248 questionnaires to obtain the real opinions of college students. The results of the questionnaires show that: in terms of learning and education, the era of AI has increased the opportunities for college students to contact with AI and their enthusiasm for learning; in terms of employment and career, the era of AI has brought employment anxiety to college students and increased their awareness of crisis; in terms of life and communication, the era of AI has facilitated the life of college students, but it has also put them in a conflict between realistic feelings and "intelligent feelings". In terms of ethics and morality, the era of AI has increased the transparency of college students and their awareness of AI ethics is lacking; in terms of expectation and confidence, college students have self-fulfillment expectation and optimism in the face of the coming era of AI.*

**Keywords:** *artificial intelligence; college students; college education; questionnaires*

## 1. Introduction

Since 2016, national policies have been implemented to accelerate the development of AI. And in July 2017, the State Council released the "New Generation of Artificial Intelligence Development Plan", which clearly identifies "intelligent education" as an important part of the national development strategy. In September 2018, General Secretary said at the World Conference on Artificial Intelligence that the new generation of AI brings new dynamics to the human economy and society and will have a profound impact on human production and lifestyles. In May 2019, General Secretary said in a congratulatory letter to the International Conference on Artificial Intelligence and Education, "China attaches great importance to the profound impact of artificial intelligence on education, actively promotes the deep integration of artificial intelligence and education, fosters innovation in education, gives full play to the advantages of artificial intelligence, and accelerates the development of education that lasts throughout the life of every person, education that is equally accessible to everyone, education that is suitable for everyone, and education that is more open and flexible. " The integration of artificial intelligence and education is an important topic in current AI research. As research on artificial intelligence in education continues to intensify, the importance of artificial intelligence in achieving the development of college education and improving the college education system has begun to emerge. Therefore, by investigating the impact of AI era on college students, it is beneficial to broaden the perspective of college education theory research. Higher education should be distinctly contemporary and must keep pace with the times. The era of artificial intelligence supported by artificial intelligence technology provides a new theoretical research perspective for college education and enriches the theory of college education research. On the other hand, the survey on the influence of AI era on college students and the real feedback of college students can provide some guidance for college education in AI era. It allows college teachers to have time for perfecting themselves, updating their teaching concepts and mastering scientific teaching methods, so as to improve the actual effect of college education.

## 2. Literature Review

Some scholars have already taken a questionnaire to combine the AI era with students and teachers as a

way to explore how to improve teaching quality and teaching models in the AI era. For example, Li Lirui etc. [1] conducted a systematic study on the current situation of data and intelligence curriculum construction for master's degree in library intelligence in foreign regions. The curriculum mainly includes three areas: basic digital intelligence thinking and skills, higher-order digital intelligence practical skills, and digital intelligence beliefs and ethics. Wang Runlan etc.[2] concluded that the overall level of intelligent educational literacy required by teacher-training students in a teacher training university in the era of artificial intelligence is average, and most teacher-training students still have more room for improvement in intelligent educational literacy. Zhao Yan etc.[3] investigated college students' perceptions and attitudes toward AI technology and its applications from two dimensions: AI education perceptions and AI education attitudes. The survey yielded the results that students who had received AI education had higher cognitive literacy, female students were more worried about privacy issues than male students, and college students' perceptions of AI education applications varied widely. Wang Dongbo etc.[4] designed questionnaires to examine intelligence students' awareness of big data and artificial intelligence around four aspects: basic information, intelligence education curriculum, intelligence personnel training objectives, and professional skills development. Xiao Lin etc.[5] analyzed the current situation of education informatization for high-quality development of basic education in Tibet by studying the factors influencing teachers' intelligent education literacy in the age of intelligence from four dimensions: informatization management mechanism, informatization infrastructure, informatization teaching resources, and teachers' informatization teaching ability.

In summary, most scholars focus on the investigation of smart curriculum construction and the investigation of factors affecting teachers' literacy in the age of intelligence, but the investigation and analysis of the impact of the age of artificial intelligence on college students is lacking. Therefore, this paper investigates the impact of artificial intelligence on learning and education, employment and career, life and communication, ethics and morality, and expectations and confidence of college students, so as to provide a reference for innovative education in colleges and universities.

### **3. Survey and statistics on college students**

#### ***3.1 Study Design***

The questionnaire consists of two parts: the first part is the basic information of the respondents, including their gender, education and profession, etc. There are 4 questions. The second part is the impact of AI era on college students, including in learning and education, employment and career, life and communication, ethics and morality, expectation and confidence, etc. There are 21 questions in total. After the design of the questionnaire, the questionnaire was distributed online through Questionnaire Star, and a total of 248 valid questionnaires were received. A total of 248 valid questionnaires were received. Details of the questionnaires are shown in the Appendix.

#### ***3.2 Characteristics of research subjects***

Of the 248 valid sample data, the number of males was slightly higher than the number of females in terms of the gender of the respondents. Among them, 133 were male and 115 were female and the scale diagram is shown in Figure 1. In terms of education, there were 133 students with bachelor's degree, accounting for more than half of the total number of respondents, while the rest were masters, specialists, and doctors in descending order and the scale diagram is shown in Figure 2. In terms of grade distribution, the largest number of respondents was in the third year, with 81 students, followed by 70 students in the second year and 34 students in the first year. The scale diagram is shown in Figure 3. From the perspective of the respondents' majors, the number of science students was nearly half, 121, followed by 63 in humanities and social sciences and 52 in engineering. The scale diagram is shown in Figure 4.

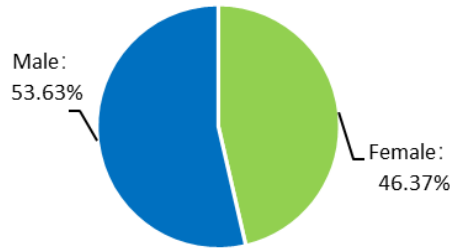


Figure 1 Gender distribution

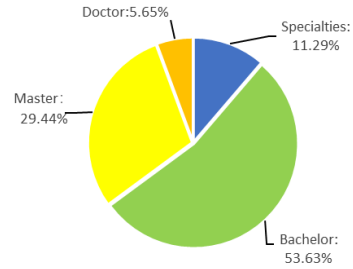


Figure 2 Distribution of Academic Degrees

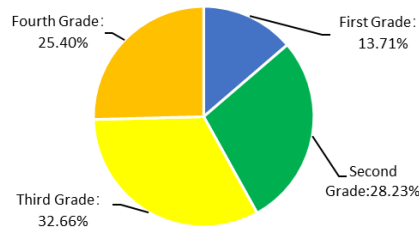


Figure 3 Grade distribution

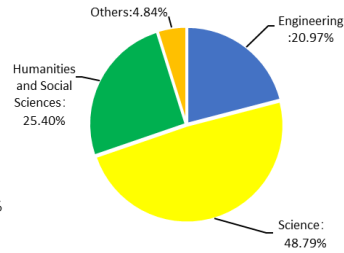


Figure 4 Professional Distribution

#### 4. The Impact of the Artificial Intelligence Era on College Students

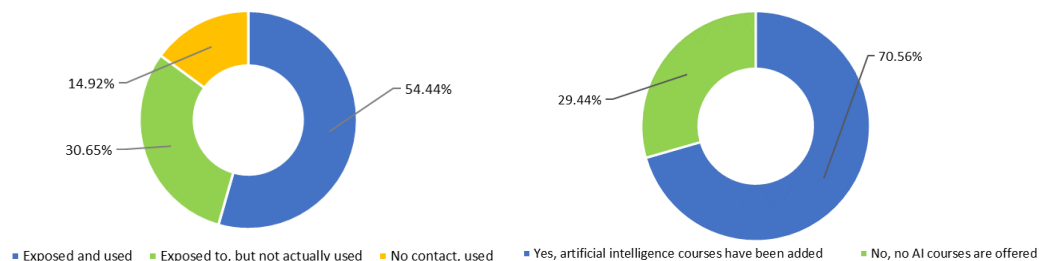
##### 4.1 Learning and Education

##### 4.1.1 Increased exposure to artificial intelligence for students in higher education

Artificial intelligence technology has gradually penetrated into various industries, including the field of education. Universities provide diverse learning opportunities for students to learn AI-related knowledge in terms of AI technology application and curriculum.

In artificial intelligence technology application, when asked, "Have you ever come into contact with or used AI related technologies in your learning process?" (As shown in Figure 5(a), 54.44% of college students chose "Exposed and used", 30.65% chose "Exposed to ,but not actually used", and only 14.92% chose "No contact , used". This indicates that as education is digitally transformed, colleges and universities are increasingly using AI technology to provide a more personalized and efficient learning experience. College students are exposed to AI-related technologies, such as online learning platforms and intelligent tutoring systems, in the course of their studies.

In terms of curriculum, when asked, "Has your college or university added courses related to AI to your curriculum?" (Figure 5(b)), 70.56% of students chose "Yes, artificial intelligence courses have been added". This shows that most universities are concerned about the rapid development of AI as a cutting-edge technology and realize that incorporating it into their curriculum can help students keep pace with technological developments. This reflects the concern of universities to keep educational content up-to-date and adaptable.



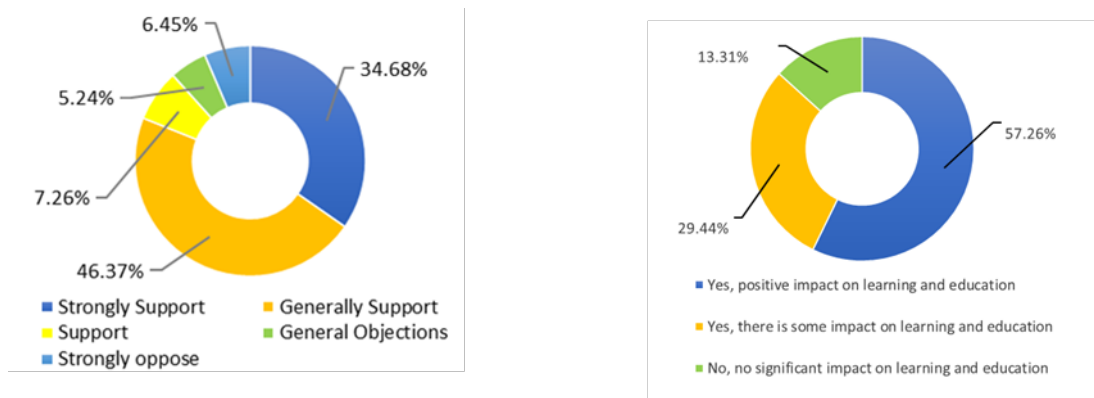
(a) The use of artificial intelligence technology tools (b) Start of AI courses in higher education

Figure 5 Educational impact of artificial intelligence on college students

The emphasis on AI in colleges and university provides students with diverse opportunities to encounter AI in various aspects such as technology application and curriculum, which can encourage students to develop their knowledge of AI and their ability to apply it, as well as provide broader learning and development opportunities.

#### 4.1.2 Artificial intelligence era inspires college students to learn

Artificial intelligence, a cutting-edge technology, involves new technical fields such as machine learning and deep learning, and is widely used in various industries and fields. It has a great potential and thus arouses students' enthusiasm for learning AI. When asked, "What is your attitudes towards the application of AI technologies in higher education (Figure 6(a)) and "Do you think AI has a positive impact on learning and education?" (Figure 6(b)), 57.26% of students believe that AI has a positive impact on learning and education, and 34.68% of students are very supportive of the application of AI technology to college education. This indicates that college students are more enthusiastic about learning AI and recognize the positive impact of AI on personalized learning, interactivity, resource abundance and improvement of learning effectiveness.



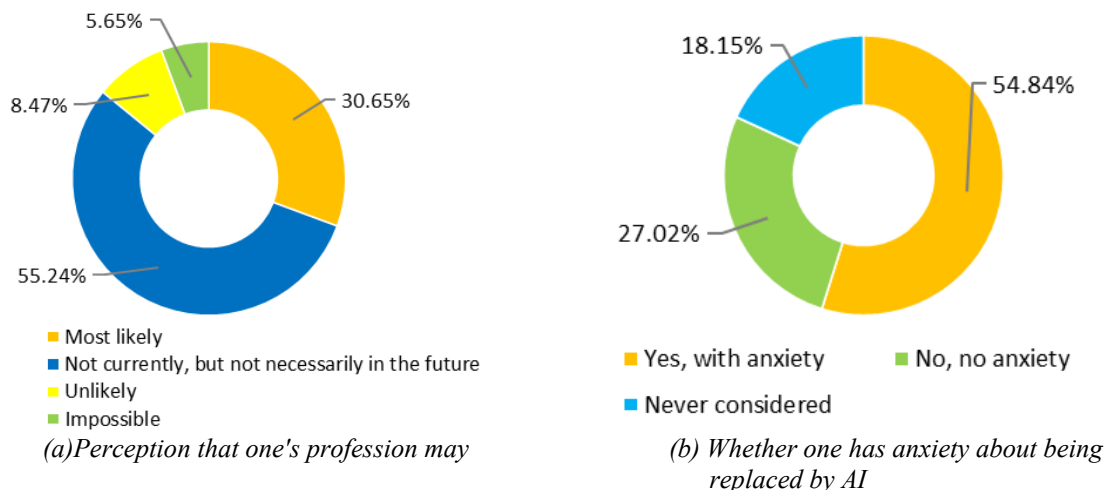
(a) Attitudes towards the application of AI technologies in higher education

(b) Impact of AI on learning and education

Figure 6 The impact of artificial intelligence on college students' enthusiasm for learning

## 4.2 Employment and Careers

### 4.2.1 Artificial intelligence era brings employment anxiety



(a) Perception that one's profession may be replaced by AI

(b) Whether one has anxiety about being replaced by AI

Figure 7 Thoughts on whether AI will replace humans

The development and application of artificial intelligence has changed the job requirements of many traditional industries, creating a certain degree of uncertainty about students' employment prospects. When asked, "Do you think your major may be replaced by AI in the future?" (as shown in Figure 7(a)), 55.24% of the students think "not currently, but not necessarily in the future". This indicates that the rapid development in the era of artificial intelligence has made the job market changes, job automation and substitution, and

changes in skill demand create great uncertainty for students' future employment, thus 54.84% of students have experienced employment anxiety (as shown in Figure 7(b)).

#### 4.2.2 Increased Crisis Awareness of College Students in the Era of Artificial Intelligence

While the era of artificial intelligence brings employment anxiety to college students, their awareness of crisis has also been enhanced. They are more aware of the challenges and changes brought by the AI era, and the importance of adapting and coping with these changes. When asked "Will you learn other knowledge and skills to cope with the impact of the AI era on your major?" (Figure 8), 48.79% of students answered "Yes, although my major will not be hit, I will also learn other knowledge and skills". This indicates that some students are concerned about possible future shocks to their majors and are willing to take proactive action to deal with such shocks. Students in higher education realize that relying only on the knowledge and skills acquired in their current majors may not meet the needs of the future. At the same time, they are more sensitive to the changing job market and technological developments, and expanding their learning and keeping it dynamic and flexible is crucial to cope with the impact of artificial intelligence.

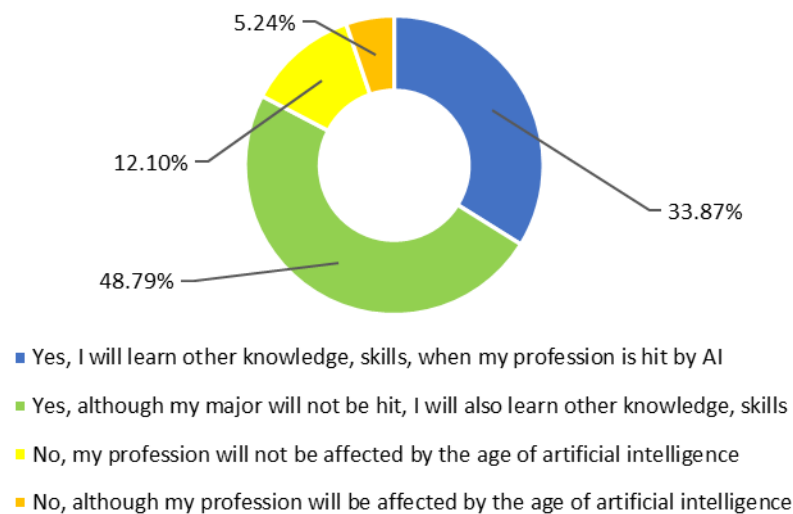


Figure 8 Whether to learn other knowledge and skills to cope with the impact of the AI era on their profession

### 4.3 Living and socializing

#### 4.3.1 Artificial intelligence era brings diverse life tools

Currently, AI applications are diverse and closely related to the lives of college students. When asked, "Which of the following AI applications have you come across?" (Figure 9), 54.44% of students chose "Machine Translation", 52.02% chose "Face Recognition" and 41.13% chose "Smart Map". From this, we can learn that machine translation and face recognition technology are more common in the daily life of college students, and the corresponding software includes Baidu translation, Google translation, Alipay, WeChat, etc. At the same time, these AI technologies are also widely used in the education sector: for example, Baidu Homework Help, English Fluent, and Little Monkey Search. These tools provide students with more opportunities to learn, communicate and collaborate through their intelligence, personalization and convenience, improving learning efficiency and quality of life. The development and application of these tools has created a richer and more diverse learning and living experience for college students.

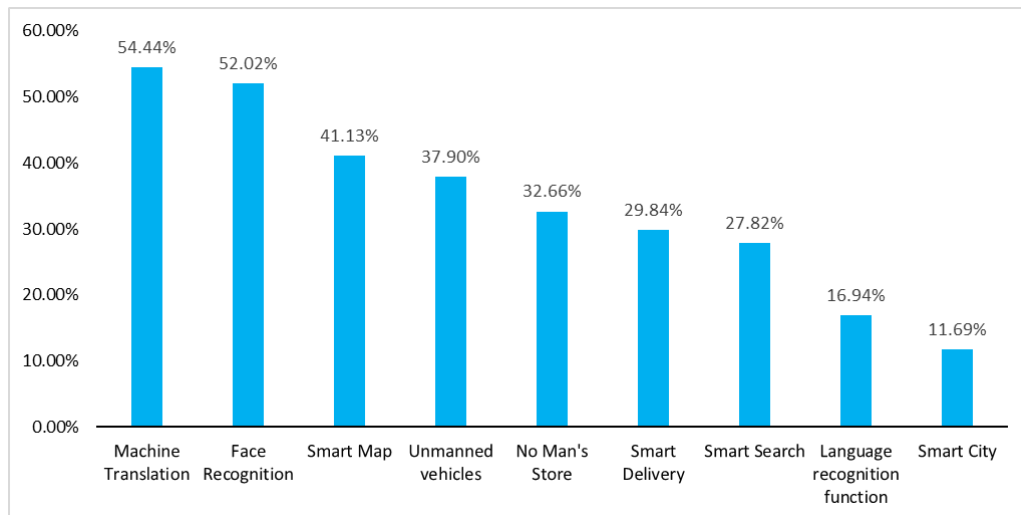
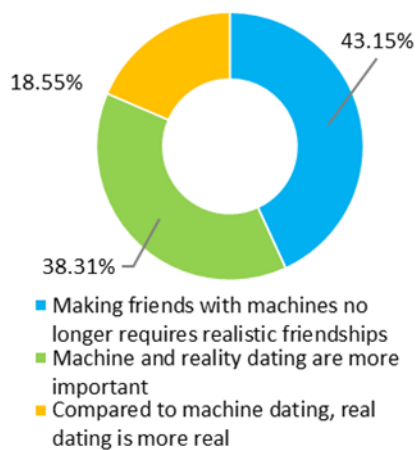


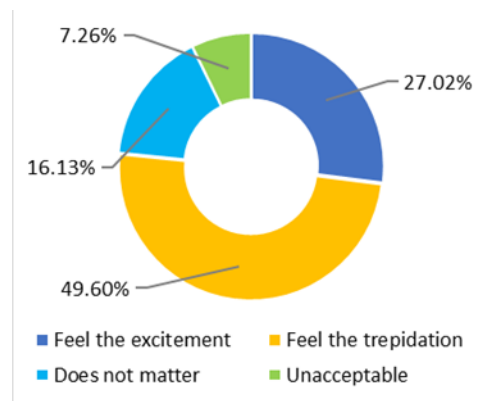
Figure 9 Exposed AI applications

**4.3.2 The contradiction between real feelings and "intelligent feelings" in the era of artificial intelligence**

In the future, chatbots are likely to become more advanced and intelligent as artificial intelligence technology advances and intelligent bots evolve. This may include more natural, fluid conversational capabilities, more accurate understanding and response to user needs, and better emotion simulation and emotion recognition. When asked, "Which type of dating do you prefer, AI machine dating or real life dating?" (Figure 10(a)), 43.15% of students chose "making friends with machines and no longer need to make real friends". This indicates that some students have more emotional investment and expectation in machine dating, hoping that it is a machine rather than a person that can provide them with a certain level of companionship and supportive entertainment. However, when asked "What is your opinion about human-artificial intelligence developing feelings (friendship, love, etc.) when the AI has autonomous consciousness?" (Figure 10(b)), 49.6% of students "Feel the trepidation", This contradicts the previous statement that "making friends with machines no longer requires realistic friendships", which may be due to the fact that although AI may exhibit emotions and feelings, they are still computer systems based on algorithms and programs. Students may perceive such emotions as simulated or false, and fundamentally different from real human emotions. This inhumanity may lead students to feel uneasy and fearful about the idea of becoming emotionally involved with an AI.



(a) Attitudes towards artificial intelligence



(b) Attitude towards artificial intelligence with autonomous consciousness and human generated feelings

Figure10 Human attitudes towards AI being too intelligent

#### 4.4 Ethics and Morality

##### 4.4.1 Students in higher education become more and more transparent in the age of artificial intelligence

Artificial intelligence systems require large amounts of data for training and learning, which may include personal information and behavioral data of college students. When asked, "In the current era of artificial intelligence, which collects a lot of data, are you willing to risk information leakage in order to make your life easier by allowing artificial intelligence to understand you better?" (as shown in Figure 11). 43.55% of students said "I am willing to provide some or all of the information to allow the AI to understand itself better", while the same percentage said "I am not willing to provide the information, but I do not have a choice". This indicates that some students are optimistic about the potential of AI technology and are willing to share information to obtain personalized services and convenience. They may believe that they can get better personalized recommendations, customized services and other benefits by providing personal data and are willing to take risks to a certain extent. At the same time, the same percentage of students are more concerned about the protection of their personal privacy and are worried about the risk of personal information leakage and misuse. Despite their reluctance to provide information, they may not be able to access specific services or enjoy certain facilities without providing personal information in the current social and technological environment. At the same time, some AI companies are privately accessing information about college students in order to provide more accurate and personalized services. This suggests that in the age of AI, college students are becoming more transparent.

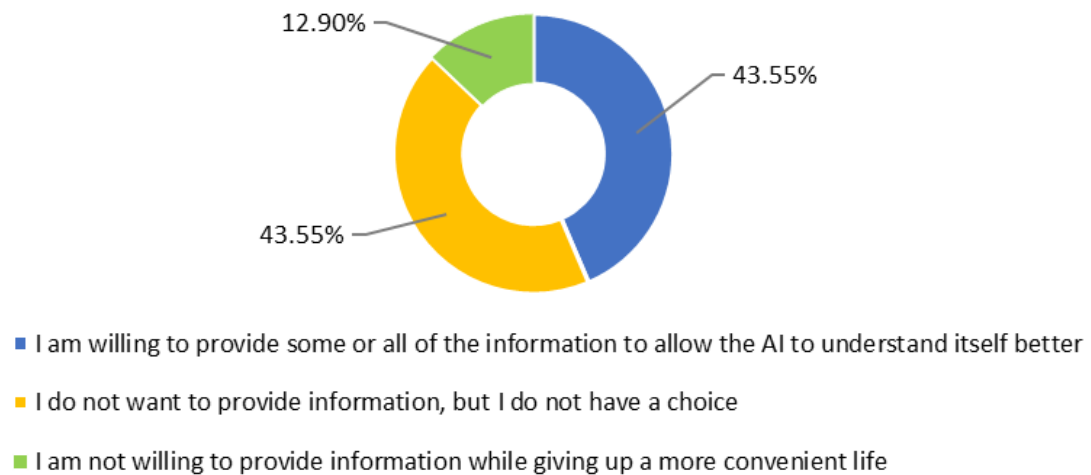


Figure11 Willingness to provide personal data to artificial intelligence

##### 4.4.2 Lack of ethical awareness of AI among students in higher education

Artificial intelligence technology has great potential, but it also involves a series of ethical and moral issues. It is important for university students to understand and master the ethical and moral principles and values of artificial intelligence. When asked, "Do you think universities should add ethics and moral education on AI to their education, in addition to the learning and application of AI?" (Figure 12). 52.82% of students said "Yes, but only moderate attention is needed", which reflects that students are more interested in education at the technical and application levels, and less concerned with ethical and moral issues. Students may believe that the development of technical knowledge and application skills is more important in AI education, while ethics and moral education can be an additional aspect. However, while students believe that a moderate focus on ethics and morality education for AI is sufficient. In fact, the importance of the ethics of AI cannot be ignored. With the development of AI, ethical and moral issues are increasingly prominent, concerning privacy, fairness, bias, responsibility, etc. Colleges and universities should incorporate AI ethics education into their curricula and provide students with the necessary knowledge and tools to think about and address ethical and moral issues.

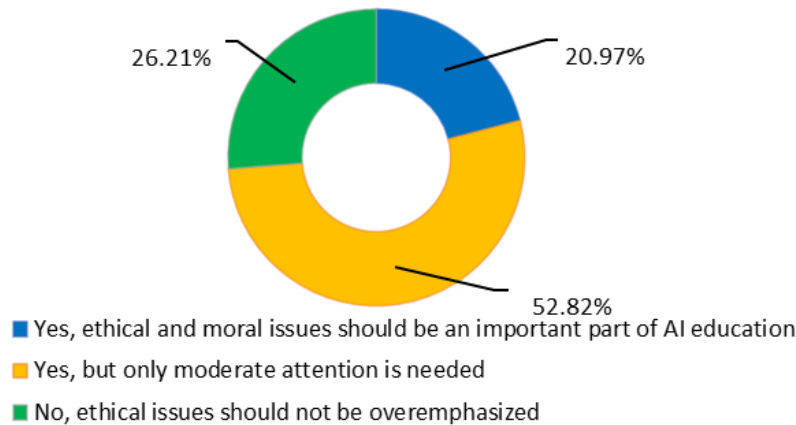


Figure12 Whether to increase the ethical and moral education of artificial intelligence

#### 4.5 Expectation and confidence

##### 4.5.1 High school students are looking forward to realizing their value in the smart era

When asked "What do you think about the notion that AI will put people out of work in the future?" (Figure 13). 33.47% of students think "impossible, AI can't replace people" and 35.08% of students think "be calm, those who can do it". This view reflects students' perception of and confidence in AI technology, and their belief that humans still possess unique strengths in many areas, such as creativity, emotional intelligence, and complex problem-solving skills, which cannot easily be completely replaced by AI. On the other hand, some students believe that the development of AI technology will bring about the disappearance of some employment opportunities, but will also create new opportunities and career fields at the same time, and that those who are capable and adaptable can still find their place and opportunities in the intelligent era. Together, this shows that college students do not believe they will be completely replaced by AI, and that they can still realize their value in the AI era.

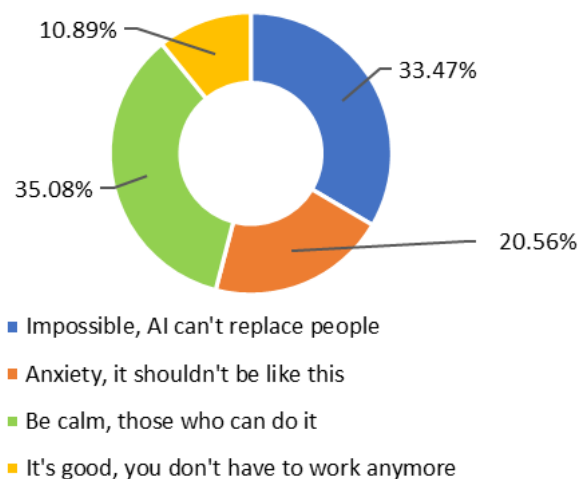


Figure13 Views on the future of artificial intelligence putting people out of work

##### 4.5.2 Positive mindset of college students facing the era of artificial intelligence

When asked "How confident are you in the future development of AI in society?" (Figure 14). 77.82% of the students thought that "More negative perceptions, such as bringing massive unemployment and increasing the poverty gap". This indicates that most students believe that the application of AI can improve efficiency, reduce people's workload, and create more time and energy for people to pursue more meaningful things. It reflects that students are optimistic about the potential impact of AI technology in the future society and believe that AI can bring positive changes and improvements to society.



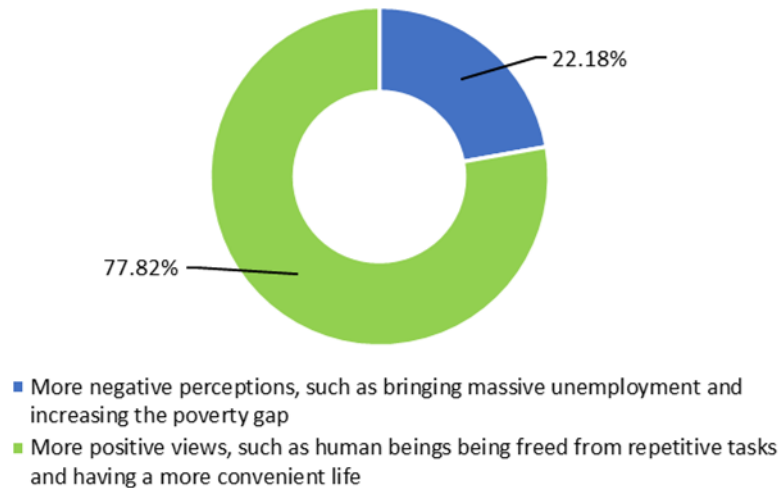


Figure14 Confidence in the future development of artificial intelligence in society

## 5. Conclusions and Recommendations

This paper explores the impact of the artificial intelligence era on college students by designing a questionnaire, and the results show that the impact of the artificial intelligence era on college students is a double-edged sword. The good side of AI is reflected in three aspects: firstly, AI era provides diversified learning opportunities for college students and stimulates their enthusiasm for learning. Secondly, artificial intelligence brings personalized life tools, which greatly facilitates the campus life of college students. Finally, AI era stimulates students' awareness of "thinking of danger" and motivates them to learn new technologies and knowledge. At the same time, through the questionnaire, the era of artificial intelligence brings negative effects to college students: the era of artificial intelligence with high technological development reduces traditional employment opportunities and brings employment anxiety to college students; college students look forward to machine friendships on the one hand, and fear that machines will produce real feelings on the other; college students' privacy is not guaranteed and have no choice; college students' ethical and moral awareness about artificial intelligence is insufficient.

With the results of this questionnaire, this paper suggests the following management implications for university education:

Create an efficient learning platform to provide diverse learning opportunities for college students. The era of artificial intelligence has a variety of emerging technologies and tools, and at the same time, college students have a stronger passion for learning. Universities should actively create a learning platform to provide different types of learning opportunities, including designing and updating AI courses, providing practical and experimental opportunities, providing online learning resources, cross-disciplinary and comprehensive quality training measures to meet the learning needs of students in the AI era.

Strengthen professional ethics education to safeguard the future career development prospects of college students. In the era of artificial intelligence, universities need to not only teach knowledge and applications of AI technologies, but also strengthen professional ethics education for students, guiding them to recognize the potential risks and ethical challenges of AI technologies, as well as learn how to address these challenges and take appropriate ethical decisions. Emphasis is placed on the ethics and responsibilities of university students in the field of AI. Students need to understand and abide by the relevant code of ethics and industry norms, and uphold a fair, transparent and responsible attitude when applying AI technologies to society.

Emphasize mental health education and encourage college students to face artificial intelligence positively. The rapid growth and change in the era of artificial intelligence has a wide range of implications for individuals and society. It may bring an increase in uncertainty, work stress, social isolation, and other mental health issues. Therefore, universities should focus on cultivating students' psychological adaptability to cope with the changes and challenges in the era of artificial intelligence. This includes incorporating mental health education into the curriculum, providing counseling services, and enhancing students' humanistic literacy.

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