Investigation on the Impact of Covid-19 on Online Activities and Ecological Environment

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Abstract. COVID-19 significantly increased people's online activity time and has a good impact on the ecological environment. School students and highly educated groups are more optimistic about the environmental changes caused by the increase of online communication. The government should strengthen the guidance of online life, learning and working mode and the education of ecological environment.

1. Introduction
The outbreak of the new epidemic at the end of 2019 had a great impact on people's communication mode, and the increase of online communication mode also had a great impact on the ecological environment. From September 19, 2020 to October 18, 2020, we obtained 630 valid questionnaires through online survey. Now we will analyze the impact of COVID-19 on online communication and ecological environment.

2. Basic situation
A total of 630 people participated in the survey, including 283 males (44.92%) and 347 females (55.08%). The age structure, education structure and occupation structure are shown in Figure 1-3.

![Figure 1](image1.png)  ![Figure 2](image2.png)

**Figure 1.** Pie chart of age structure of respondents

**Figure 2.** Pie chart of educational structure of respondents
3. Analysis of the impact of COVID-19 on online communication
COVID-19 has a serious impact on people's production, life and learning. Kou Zonglai (2020) believes that COVID-19 has a huge customer base for online conference and online learning in a very short time through an extreme way, so as to push these new forms onto a new track of rapid development [1]. Shang Shouwei (2020) believes that COVID-19 not only brings great challenges to the "teaching paradigm" of colleges and universities, but also creates opportunities for the "learning paradigm" of college students [2]. Fu Weidong and Chen Annie (2020) believe that COVID-19 is a major change in information-based teaching and learning methods for primary and secondary schools, but there are problems such as low level of communication and interaction and poor learning effect [3]. Zhang Ping (2020) thinks that the change of learning form will increase the learning pressure of college students [4].

3.1. COVID-19 makes the proportion of Internet time increase is much higher than that of Internet time decrease
As shown in Figure 4, the proportion of online time increase after COVID-19 is 50.32%, the proportion with no significant change is 39.84%, while the proportion of online stay time decrease is only 9.84%. This shows that most of the respondents' online time increased after COVID-19.

3.2. COVID-19 has changed the way people learn and work
As can be seen from Figure 5, people's online time from more to less is work (23.17%), learning (23.02%), browsing websites (19.84%), chatting (9.52%) and playing games (8.10%), which shows that people mainly use Internet for work and study.

3.3. COVID-19 significantly reduces the travel mileage of long-distance public transport
After the occurrence of covid-19, 38.73% of the respondents reduce the air mileage and train mileage, while only 4.76% increase the airplane mileage, 7.94% increase the train mileage, and 26.67%
increase the car ride, which is basically no difference from the reduced 26.35%. This shows that people are not willing to travel by air or train and other long-distance transportation.

3.4. COVID-19 has changed people's income and expenditure
After the occurrence of COVID-19, the proportion of respondents whose income did not change reach 62.70%, but the proportion of income decrease is 32.86%, which is significantly higher than the proportion of 4.44% of income increase. Different from the change of income, only 45.08% of respondents have no obvious change in expenditure, but the proportion of increase expenditure is as high as 37.78%, which is much higher than the 17.14% decrease in expenditure.

3.5. Online communication improves people's quality of life and production
Different from the general impression, the survey finds a strange conclusion that online communication seems to improve the quality of people's life and production. The proportion of respondents who think that online communication has a good impact on the quality of life is as high as 36.83%, which is significantly higher than that of 27.61% who think that there is a bad impact.

4. Analysis of the impact of COVID-19 on ecological environment
The existing scholars focus on the impact of ecological environment changes on the epidemic situation. Zhang Tingwei [5] believe that large cities are more vulnerable to the COVID-19 due to the aggregation of living environment. Wang Ying believes that human impact on ecosystem balance increases the probability of virus mutation and the risk of infectious disease outbreak [6]. Some scholars, such as Tian Jing believes that the reduction of pollution source emissions during the COVID-19 period has a certain role in promoting the improvement of environmental quality in the short term [7]. However, there is still a lack of COVID-19 in-depth investigation and systematic research on the ecological environment, which is also the question that this paper hopes to answer.

4.1. Analysis on the change of respondents' perception of ecological environment before and after COVID-19
In terms of the overall ecological environment, 62.06% of the respondents feel that there is no obvious change, but the proportion of those who feel better is 30.79%, which is significantly higher than 10.79% of feel worse. In terms of water environment, 74.29% of the respondents feel no obvious change, but 21.59% felt better, which is significantly higher than 4.13% of feel worse. In terms of air quality, 68.10% of the respondents feel no obvious change, but 27.62% feel better, which is significantly higher than 4.29% of the respondents who feel worse. In terms of domestic waste, 59.05% of the respondents feel that there is no significant change, but the proportion of those who feel better is 30.16%, which is significantly higher than that of 10.79% of the respondents who feel that the domestic waste has significantly worse. As shown in the Table 1 below.

Table 1. The change of respondents' perception of ecological environment

|                        | No obvious change | Significantly better | Significantly worse |
|------------------------|-------------------|----------------------|--------------------|
| Overall ecological environment | 62.06%            | 30.79%               | 10.79%             |
| Water environment       | 74.29%            | 21.59%               | 4.13%              |
| Air quality             | 68.10%            | 27.62%               | 4.29%              |
| Domestic waste          | 59.05%            | 30.16%               | 10.79%             |

4.2. Analysis of respondents' perception of the impact of online communication on ecological environment
The results on the impact of online communication on the ecological environment after the outbreak of COVID-19 are shown in Table 2. In terms of the overall ecological environment, 41.59% of the...
respondents think that has a slight positive effect, 16.35% think that has a huge positive effect, 16.35% think that has a slight negative effect, only 2.06% think that has a huge negative effect, and 33.33% think that there is no effect. In terms of water environment, 37.62% of the respondents think that online communication has a slight positive effect on water environment, 12.54% think that has a huge positive effect, 6.67% think that has a slight negative effect, only 2.06% think that has a huge negative effect, 41.11% think that there is no effect. In terms of air quality, 40.48% of the respondents think that online communication has a slight positive effect on air quality, 14.60% think that has a huge positive effect, 7.30% think that has a slight negative effect, only 1.59% think that has a huge negative effect, 36.03% think that there is no effect. In terms of soil quality, 36.98% of the respondents think that online communication has a slight positive effect on soil quality, 10.48% think that has a huge positive effect, 5.87% think that there has a slight negative effect, only 1.27% think that there has a huge negative effect, and 45.40% think that there is no effect.

Table 2. The change of respondents' perception of the impact of online communication on ecological environment

|                      | Slight positive effect | Huge positive effect | Slight negative effect | Huge negative effect | No effect |
|----------------------|------------------------|----------------------|------------------------|----------------------|----------|
| Overall ecological environment | 41.59% | 16.35% | 16.35% | 2.06% | 33.33% |
| Water environment    | 37.62% | 12.54% | 6.67% | 2.06% | 41.11% |
| Air quality          | 40.48% | 14.60% | 7.30% | 1.59% | 36.03% |
| Soil quality         | 36.98% | 10.48% | 5.87% | 1.27% | 45.40% |

4.3. Difference analysis of different groups of respondents' perception of the impact of online communication on ecological environment

From the perspective of educational structure, the higher the proportion of respondents who think online communication has a positive impact on the ecological environment is higher. The proportion of respondents with high school, junior college, undergraduate, and graduate education believed that online communication has a positive impact on the overall ecological environment is 43.14%, 50.00%, 56.64% and 70.65% respectively, on the water environment is 39.22%, 41.86%, 49.42% and 60.55% respectively, on the air quality is 43.13%, 39.54%, 55.78% and 66.67% respectively, on the soil quality 41.18%, 37.21%, 47.68% and 55.1% respectively.

From the perspective of career structure, students and civil servants are more optimistic about the impact of online communication on the ecological environment. Among them, 64.08% of the students think that online communication has a positive impact on the overall ecological environment, 54.93% think it has a positive impact on the water environment, and 59.16% think that it has a positive impact on the air quality, which rank first in all occupations. The proportion of freelancers who think that online communication has a positive impact on the overall ecological environment (49.5%), the proportion that they think it has a positive impact on the air quality (50.49%) and on the soil quality (45.54%) rank last in all occupations. Table 3 shows the perception of the impact of online communication on the ecological environment of respondents in all occupations.
Table 3. Perception of the impact of online communication on ecological environment of respondents in all occupations

|                      | Positive effect on overall ecological environment | Positive effect on water environment | Positive effect on air quality | Positive effect on soil quality |
|----------------------|--------------------------------------------------|-------------------------------------|--------------------------------|--------------------------------|
| Students             | 64.08%                                           | 54.93%                              | 59.16%                         | 47.19%                         |
| Enterprise employees | 59.38%                                           | 51.04%                              | 53.64%                         | 46.88%                         |
| Public institutions (social organizations) employees | 53.55%                                           | 42.77%                              | 55.12%                         | 47.24%                         |
| Freelancers          | 49.50%                                           | 47.52%                              | 50.49%                         | 45.54%                         |
| Civil servants       | 61.77%                                           | 54.42%                              | 57.35%                         | 52.94%                         |

5. Conclusions

Through the investigation, we can draw the following conclusions. First, after the occurrence of COVID-19, people are more inclined to study and work online, and people's communication, work and learning methods are undergoing important changes. Second, although the proportion of respondents who feel no obvious change in the ecological environment is the highest, the proportion of feeling better is significantly higher than that of feeling worse. This shows that after COVID-19, people reduce social activities and bring positive changes to the ecological environment. Third, most respondents think that online communication has a good impact on the ecological environment. It is suggested to improve from the following aspects. First, strengthen the research and guidance of online communication activities, so that people can develop a healthier online life, study and work mode. Second, the government should strengthen the education of the freelancers and low educated groups to improve their environmental protection literacy.

6. References

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