Student's name
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Course
Date

Should We Blame Computers for Students' Getting Worse in Studying?

Teachers have many reasons for dissatisfaction because of computers used during lectures. Firstly, not all students are ideal listeners and able to avoid the use of the Internet during lectures. Many of them can type fast, and it saves them a lot of time, which is usually used for chatting with friends or browsing the Internet. Secondly, the latest research has shown that the use of computers might have an undesirable effect on learning, even if they are used only for making notes. It turns out that writing on paper itself is more effective for learning than typing.

There are many investigations devoted to the process of writing. Most of them agree that the process of note-taking has a beneficial effect on studying. Researchers believe that longhand writing may affect learning via external storage and encoding. External storage allows numerous reviews of the material. Encoding encourages analyzing and summarizing the material (Mueller and Oppenheimer 1159). If students make notes using paraphrasing and abbreviations, it means that they are far from primitive reproduction. The number of works devoted to typing is relatively small. Most of these studies were performed when computers were not widely used. Several more recent studies did not report a serious difference between writing and typing, but the

conditions of experiments were far from real. Experiments usually were carried out in the form of questions and answers, and the set of questions demanded only superficial understanding. None of the tests demonstrated typing efficiency in the conditions of a real lecture (Mueller Oppenheimer 1160).

It seems matter-of-course now to see how students sit on lectures without writing utensils and exercise books, just having a computer. It looks as though the days of pens are long gone, and there would never be a need to have a sheet of paper to make some notes. Many of students like to have laptops during lectures, not worrying about the dissipation of their attention to the subjects not related to the topic of the studying. Having multi-tasking activities, they do not care that it usually leads to the decrease of attention and cognitive decline. In addition, it significantly decreases mental productivity and increases fatigue. As a result, the process of studying turns into a formal and mechanical occupation when students perceive information only verbally. Surveys have shown that the students who use notebooks are less satisfied with own results than the students who do not use them. This problem looks easy to handle. It is enough to remove all distracting factors and make students use laptops just for making notes. The study made by Pam A. Mueller and Daniel M. Oppenheimer has revealed that a problem lies much deeper.

Three experiments were conducted to check whether the use of laptop impairs academic performance. The first experiment was carried out using the help of 67 students from Princeton University, consisting of an equal number of men and women (Mueller and Oppenheimer 1160). Investigators provided them with laptops having standard screen size, pens, and sheets of paper. Participants listened to five audio lectures that might be considered curious but not well-known. Students usually took part in the experiment in pairs, but there were several cases when students participated alone. Participants were stimulated by using interesting information. They were instructed to behave as

if they attended an ordinary lecture. The experimenter was out during the procedure. After finishing of the imaginary lecture, students had some distracting activities; and after that, they were asked some questions. There were two groups of questions. The first group contained questions that requested simple recalling. The second group consisted of the more complex questions that demanded analyzing information. Students who used laptops made more notes than students who made notes on paper. However, if they had no possibility to review this information, their replies were worse than the replies of those who used pens and paper.

Then researchers decided to improve the experiment by instructing the students of not making just verbatim notes. Another group of students from the Los Angeles University took part in the experiment number 2 in the amount of 151 people. Participants were stimulated by payment of 10$ per hour (Mueller and Oppenheimer 1162). Students received personal monitors and earphones with either the laptops or sheets of paper and pens. Participants were divided into two control groups. The first group was instructed to do notes as if they visited an ordinary lecture without any additional comment. The second group received the same instructions, except for the students using laptops who were informed to make notes more thoughtfully. The report was unclear about whether the students instructed about thoughtful behavior got better results than uninstructed students. Laptop users still demonstrated wordiness in comparison with pen users. Like in the first experiment, they made more notes but displayed lower level of understanding.

Taking into consideration the fact that laptop users make more notes, investigators suggested that they may better manifest themselves than in previous experiments having more time to prepare. In order to check this assumption, the third experiment was organized. Participants of the experiment were 109 students from the University of California, including 27

males. Participants received 6$ for the first session and 7$ for the second (Mueller and Oppenheimer 1164). The form of the test was the same as in experiment number two. Students were delivered useless but interesting information. All of them were provided with personal screens and earphones and either laptops or sheets of paper and pens. They were informed that they would be checked in a week. Every participant had a possibility to look at their notes for ten minutes before they were tested. Students had to answer ten questions on four different topics. The outcomes were very similar to the previous results. Participants who did not study showed similar results. It did not matter whether they used laptops or pens. The rest of the participants demonstrated better results for pen users.

This study was conducted comprehensively, including the immediate and delayed testing and instructions against making notes verbally. Thus, the study may be considered reliable. We can make a conclusion that nevertheless making notes on a computer is easier, it is usually performed in a more mindless and formal fashion. Students using laptops are able to save more information, but they are less predisposed to analyzing and making conclusions. Experts have an opinion that pen and keyboard bring into play different cognitive processes (Chemin). Handwriting is a more complex process because it requires different skills, including the moving of pen controlled by the thought. It usually takes several years to study. Typing on the keyboard is much easier. Children study keyboard very fast, but they have more space for creativity using a sheet of paper and a pen because there are many things impossible to do on the computer. Writing with pen keeps visual and tactile effect of the work and permits using such mechanism as body or muscle memory. It is reported that drawing letters by hand improves reading (Chemin).

Computers have penetrated into all spheres of our life. It is possible that in the near future, it will be as hard to find a ball as to find a steam engine now. This

process seems to be irreversible, but let us ask ourselves if we do not lose something important. The above studies have shown that longhand writing makes a great contribution to the development of intellectual abilities. It encourages people to think and analyze more. Therefore, there must be a reasonable compromise in the use of computers and traditional writing.