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Explication of the Remote Education Through Department Statistics: ESOGU-CENG Case Study

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Abstract – Education has been reshaping with the increasing use of the Internet and creation various online models. Lifelong learning has been evolving with each passing day. Nevertheless, Covid-19 has caused necessary changes in the education field and affected all people, from students to instructors. However, students' concerns about remote education have emerged during this forced circumstance. This unintentional situation directly hit the quality of education. In this study, the last ten years of education were interpreted through department statistics. The effect of Covid-19 on students from the ESOGU Computer Engineering Department was investigated by considering the activity status, success rates, and letter grades along with course statistics within remote education. The statistical findings can play a significant role in automation and suggestion systems design. In addition, it has been explicated that compulsory transitions in every field can have great impacts and that it is necessary to be prepared for such conditions in advance, especially in the field of education.

Keywords *– Covid-19, effects of the pandemic, online education, remote education*

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I. INTRODUCTION

Innovative changes have been occurring in many areas with the widespread use of the Internet. Changes have primarily been experienced in social, economic areas, and especially the education field, which is one of the first areas to keep up with today's innovative approaches and changes. With the use of the Internet in education, new models were created [1]. It is aimed to catch up with technology and provide quality education. The concept of remote or distance education is an innovative model that emerged with computer-internet technologies. This model is the digital version of traditional face-to-face education. Many institutions recognize that online programs are strategically crucial to the institution. It is observed that the number of students taking online courses continues to increase at a rate far above the increase in enrollment in general higher education [2]. With the transition to remote education, people of all ages and levels have the opportunity to learn regardless of physical classrooms. This education style provides efficiency by combining virtual and remote laboratory conditions and easily visualizing objects beyond perception [3]. Accessibility to education is also provided for disabled users. Users can come together in the remote education environment and communicate with people from different fields of expertise living in different places. Students prefer remote education because of its independence from the environment, the flexibility of online courses, unlimited replayability, and easy accessibility with a smartphone [4]. The spread of the Internet as a potential remote education environment and the creation of remote education programs with the awareness of lifelong learning is becoming more common day by day [5]. Although this spread is voluntary, it can also be due to health issues surrounding the whole world, such as the Covid-19 pandemic. Covid-19 caused a change in many branches of activity and even made it necessary. As of March 10, 2020, schools and universities worldwide were closed due to Covid-19, and as of April 2020, many countries experienced full closure [6-8].

Face-to-face education has been moved to online education platforms during the pandemic. This situation directly touched the quality of education. The compulsory change that came with Covid-19 also affected the subjects of universities, such as working, research, activity, and education style. Educational institutions using online education systems have easily adapted. While this transition was an innovative approach, suitable for technology and the era, not everyone

was equally ready for it [9]. Students' concerns about online education platforms, such as access speed, reliability, timely delivery of video information technology, course management, communication and interaction, and technical support, have emerged [10]. In the institutions that do not use distance education, problems such as infrastructure inadequacies, internet problems, insufficient knowledge of the personnel about distance education were encountered. It also has other technical requirements such as the design and preparation of e-learning environments, internet bandwidth, and device incompatibilities [11]. These adverse situations have caused the expected efficiency from education, dissatisfaction with students, and prejudice against online platforms. Institutions and students have preferred remote education according to its advantages and disadvantages. However, during the Covid-19 period, choices turned into obligations. With the spread of the pandemic, distance education has become a necessity.

Preparing data for analysis and processing is essential in an automation or recommender system. Interpretation of student data is equally important in the design of course recommendation systems, especially during the transition period to the pandemic. In this study, the effect of the pandemic period on student success was examined through a semester perspective. The pandemic effects on student grades were examined from term to term. The face-to-face and remote education were analyzed comparatively. It has been seen that the obtained results and comments can play a significant role in course/student automation and suggestion systems design.

II. Materials and Method

In this study, the statistics of the Eskişehir Osmangazi University Computer Engineering Department (ESOGU-CENG) were utilized. The data of the last ten years regarding the semesters between 2010/11-Fall and 2020/21-Spring were analyzed. Nevertheless, summer terms were not included. The dataset involves anonymized student and course information for both face-to-face and remote education semesters [12]. There was a transition to remote education in the 2019/20 education period with the onset of the Covid-19 pandemic. Fig. 1 illustrates the forced transition and the remote education period due to Covid-19 through the dataset in practice.

The grading system for letter grades DD, DC, CC, CB, BB, BA, and AA ranges from 1 to 4, and increases by 0.5 for each letter grade, respectively. FF is not a valid passing grade, and its numerical value is zero. Moreover, for non-credit courses, there are two grades, YT and YZ, respectively, pass and fail.

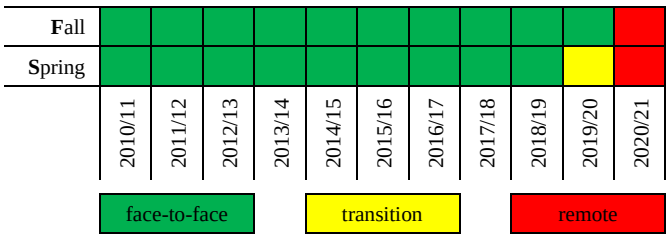


Fig. 1. The Covid-19 period in education through the dataset

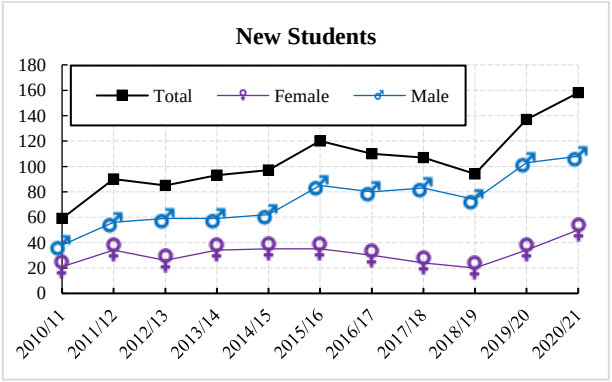
III. Results and Discussion

While interpreting the data according to the research questions, it was handled in three main perspectives. Details of these approaches are presented in Figures 2-4 as student, course, and performance statistics, respectively. Within the framework of the curriculum, the courses offered in the fall and spring semesters are fixed. For this reason, a semester-based analysis was carried out while conducting the course and performance analysis, nearly for all subplots.

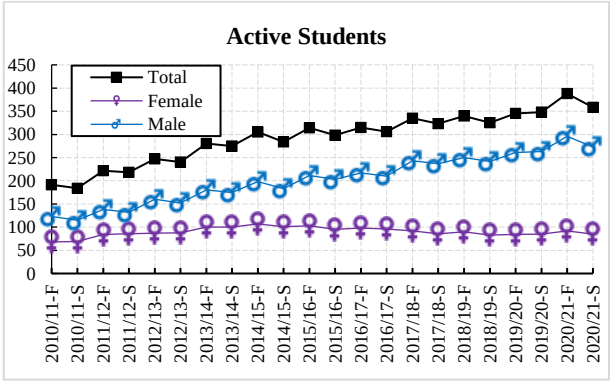
A. Student Perspective

With the first effect of the pandemic, an increase in the number of new enrollments for students of both genders is seen in Fig. 2 (a). The number of new students shows a general increase until the 2015/16 academic year. Between the 2015/16 and 2018/19 academic years, there has been a decrease in the number of female students in particular. With the first effect of the pandemic, an increase in the number of new enrollments for both male and female students is seen. This shows that distance education does not have a negative effect on the number of students.

According to Fig. 2 (b), the number of active students has increased continuously every year. Considering the fall and spring semesters separately, the high number of graduations in the fall semester causes a decrease in the number of active students in the spring semester. The number of active students increases with the course taken in the fall semester. Especially after the transition to distance education, there is a higher increase in the first fall semester compared to previous years. It may result from students thinking that they can attend classes more comfortably and flexibly with distance education. Besides, students who could not continue their education due to financial difficulties and were in the position of passive students due to accommodation problems were able to switch to active student status with the distance lessons.



(a) Total number of new students



(b) Total number of active students

Fig. 2. Student statistics

B. Course Perspective

Considering the number of courses during the pandemic, it can be deduced that there is a noticeable decrease. Figure 3 (a) shows that with Covid-19 (starting with the 2019/20-F), the number of courses opened has decreased with the opportunity to conduct courses remotely. Before distance education, there were courses that students demanded intensely but could not take due to physical classroom capacity and laboratory facilities. With distance education, students' preference for these courses may have caused fewer or no-preferred courses to be not opened. In addition, reducing the courses to a single online class may also be effective in this decrease.

When the effect of the number of courses opened is reduced to the types of courses, there has been a serious decrease in the number of compulsory courses, as can be seen in Fig. 3 (b). This can be explained by the elimination of physical classroom capacity constraints with online education and the reduction of compulsory courses to a single class. Besides, it is seen that there is a decrease in the number of technical courses and an increase in the number of non-technical courses. This may be due to the fact that students want to reduce the number of responsible courses by taking courses that are not directly related to the department they are studying in and do not contain technical knowledge but have an impact on graduation. In addition, they want to take technical elective courses that will contribute greatly to their professional development, with face-to-face training in case the pandemic disappears.

As seen in Fig. 3 (c), the highest decrease is observed in the number of courses offered in English when analyzing the courses based on the language. Apart from the non-technical elective German course itself, there is no other course whose language is German. Therefore, one increase in the number of courses taught in German can be ignored. However, students may have decided to take Turkish lessons as easier to understand. The decrease in the total number of courses in Figure 3 (a) with the transition to distance education may explain the decrease in the number of Turkish courses offered in Figure 3 (c).

According to Fig. 3 (d), before the transition to distance education, it was not possible to draw a definite conclusion about the increase or decrease in the number of courses offered on a class basis. However, with the decrease in the total number of courses offered through distance education, it is seen that there is also a decrease in the number of courses offered on a class basis.

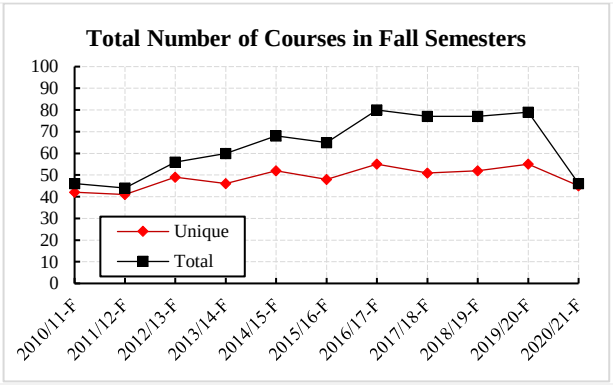
C. Grade and Performance Perspective

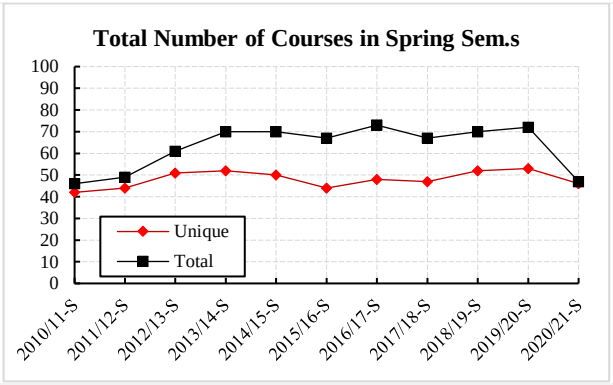
Considering the students' success, letter grades can be seen properly improved; however, the GPAs cannot be clearly classified. Total grade counts in different semesters are shown in Fig. 4 (a). In this subplot, although there is a periodic increase in the number of courses taken by students for the first time in both the Fall and Spring semesters, it is seen that the increase is higher in percentage with the pandemic (starting with 2019/20-F). Moreover, the number of courses students re-take in the 2020/21-F semester is higher than in the 2020/21-S semester. This situation can be explained by the increase in the number of courses students re-take at the beginning of the pandemic.

Fig. 4 (b) shows the counts for Mandatory, Technical Elective, and non-Technical Elective courses. This graph shows that there has been an increase in the number of courses taken for the first time as of the 2018/19-F term. The Covid-19 period did not greatly affect a student's taking a course for the first time. However, considering the number of courses taken again, there has been an increase in the number of courses taken again from the 2019/20-F Covid-19 transition period to the 2020/21-F term. With the 2020/21-S term, the number of courses students take again has decreased.

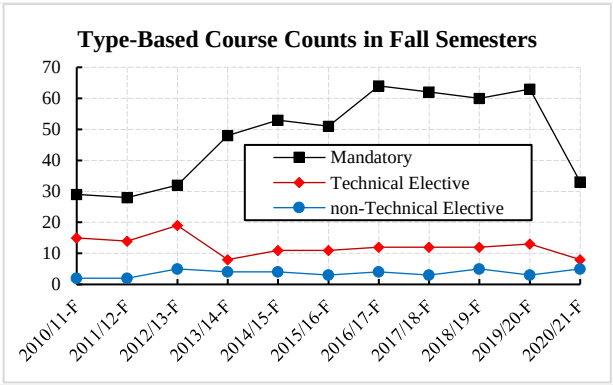
Grade percentage values are given in Figure 4 (c). In this graph, an increase was observed in the number of students with especially high letter grade values in the fall semester. In the spring semester, an increasing-decreasing variable situation was observed for all letter grades. In particular, the percentage increases that started with the 2019/20-F period doubled during the Covid-19 period, and the percentages of students taking AA increased significantly. Although the similar situation is not as high as the change in the percentages of students taking AA, it was also observed in the percentages of BA letter grades during the Covid-19 period. Due to these increases, there has been a decrease in the percentage of students who received DC+DD letter grades, which can be considered below the average. Despite this success, an increase was detected in the number of students who received FF for the same semester. Although the percentage of students who failed the course by taking FF started to decrease, the biggest decreases coincided with the Covid-19 period. This shows that there has been an increase in student success percentages and a decrease in school dropout rates during the Covid-19 period. This situation can be explained by the fact that students focus on their success in education together with the restrictions on going out due to the pandemic.

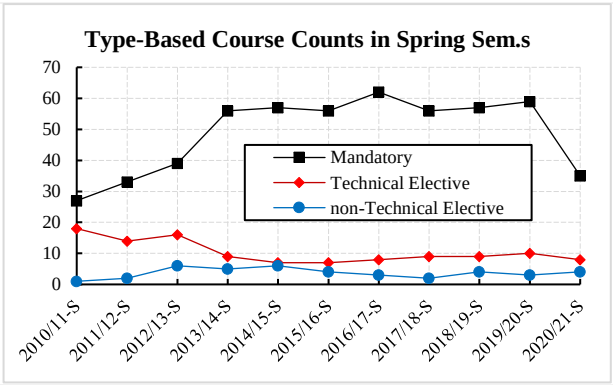
The letter grade percentages of the courses that the students take as non-credit and evaluate as pass (YT) or fail (YZ) are given in Fig. 4 (d). Although the number of courses opened in the semester varies, the percentages show that the YT grade percentages decreased at low rates until the 2018/19-S period. As of 2019/20-F, there has been an increase in YT letter grade rates until the 2020/21-S period. While there was an increase in YT course grade rates, students' YZ grade rates decreased. This shows that the success rates of students in non-credit courses have increased during the Covid-19 period or that students pass the courses more easily.



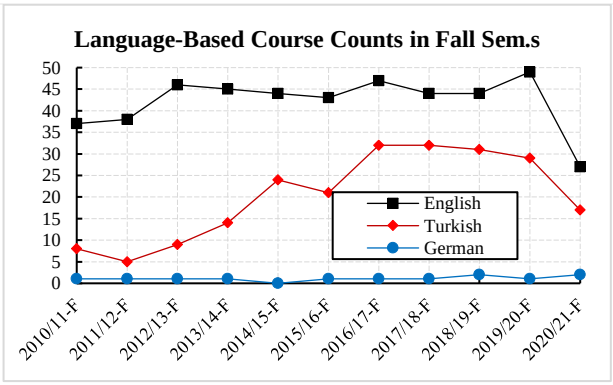


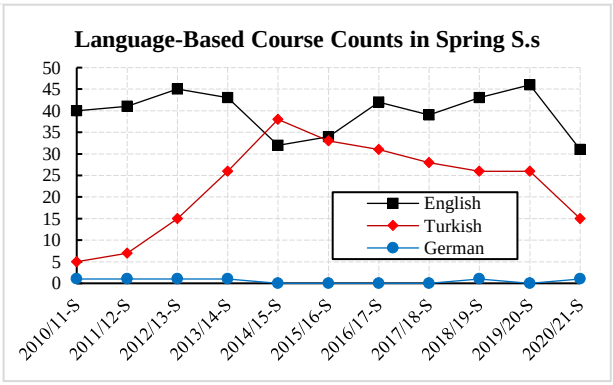
(a) Total number of courses in different semesters



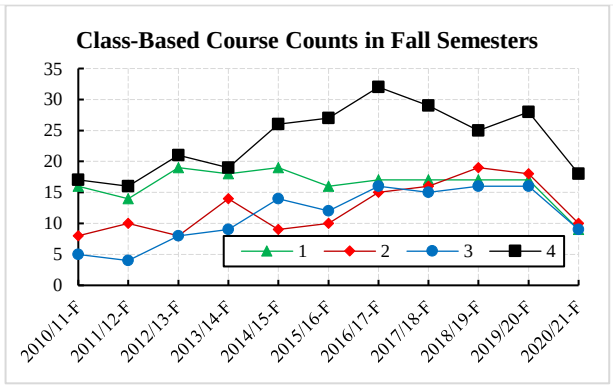


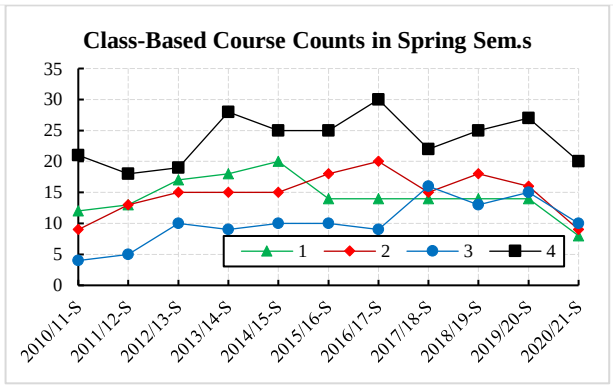
(b) Course type counts in different semesters





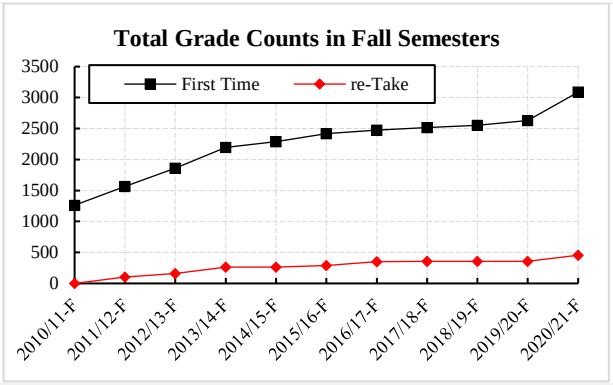
(c) Course language counts in different semesters

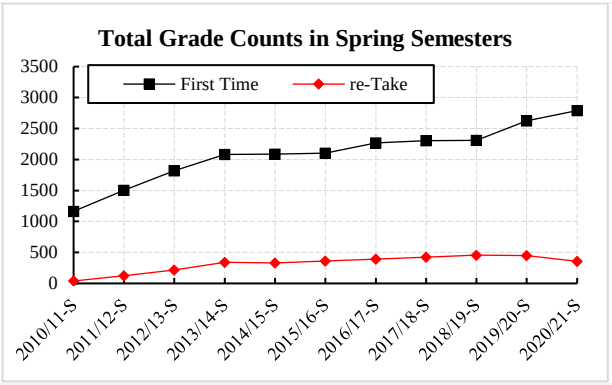




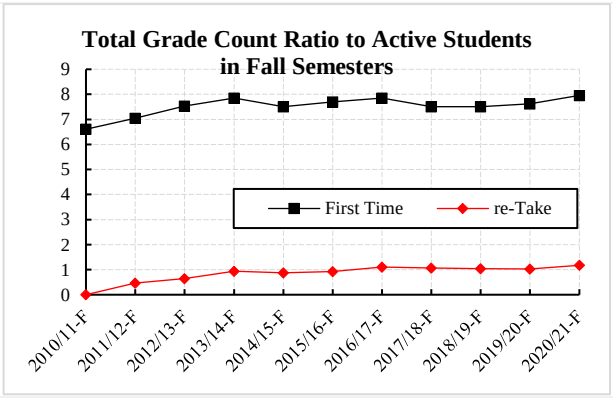
(d) Course class counts in different semesters

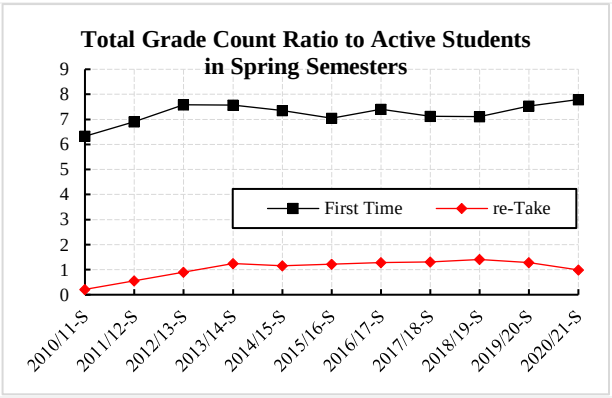
Fig. 3. Course statistics



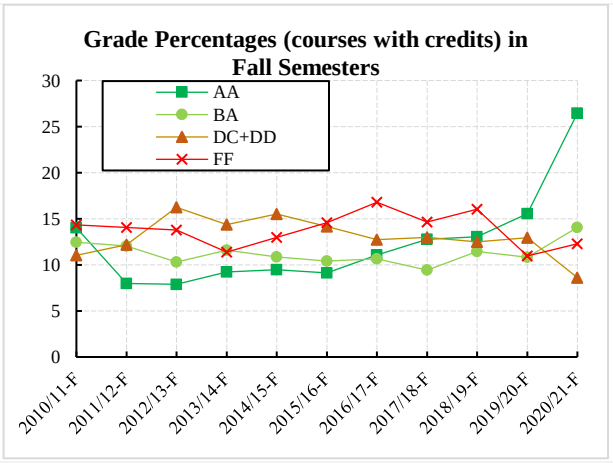


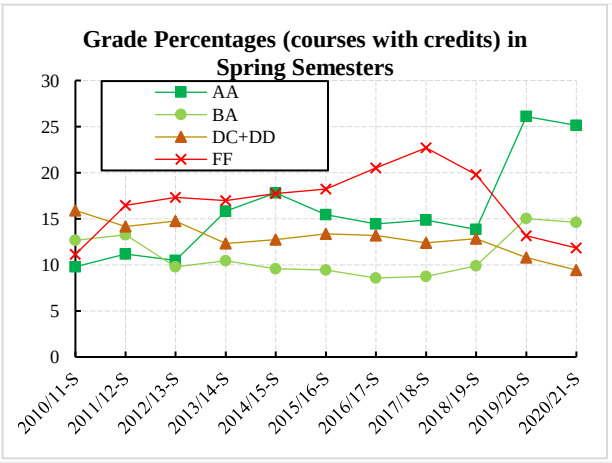
(a) Total grade counts in different semesters



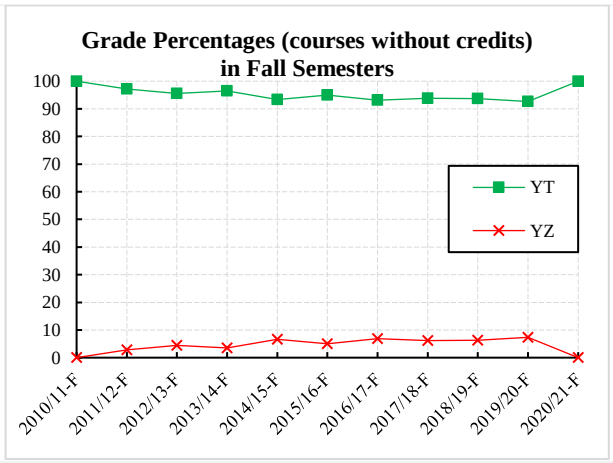


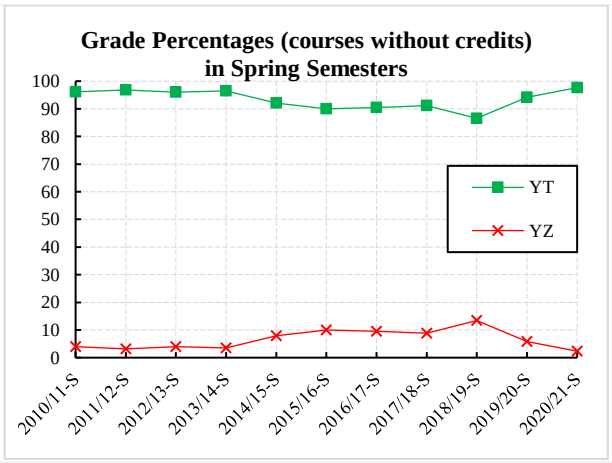
(b) The grade count ratio to active students in different semesters





(c) Letter grade percentages in different semesters (with credits)





(d) Letter grade percentages in different semesters (without credits)

Fig. 4. Grade and performance statistics

IV. CONCLUSION

The Covid-19 pandemic, which has affected the world since 2020, negatively affected the whole world in many areas. Countries decided on full shutdowns and tried to keep health measures at the maximum level. Unexpected events due to Covid-19 and uncertainties about the course of the pandemic affected many organizations, especially educational institutions. Considering the complete closure, the one alternative way applied in education has been distance applications. While some universities were prepared for this compulsory transition, some were caught otherwise. In this study, the effect of Covid-19 on students from the ESOGU Computer Engineering Department was investigated by considering student activity status, success rates, and letter grades within distance education. With statistical analysis during Covid-19, an increase was observed in the number of students, while an obvious decrease was observed in the number of offered courses. This is explained by the reduction of the multiple classes (which have to be divided due to the number of students) of the same course to a single, especially for compulsory courses, with the elimination of physical class condition constraints and the increase in students' orientation to certain technical courses. Especially in the 2020/21-F period, when the pandemic started, a remarkable improvement was observed in the academic success of the students, while this situation preserved itself in the spring period as well.

All in all, these kinds of statistical findings can affect the automation and suggestion systems design powerfully. Moreover, it has been clarified that it is necessary to be prepared for compulsory transitions in advance, especially in the field of education.

Authors' Contributions

The authors' contributions to the paper are equal.

Statement of Conflicts of Interest

There is no conflict of interest between the authors.

Statement of Research and Publication Ethics

The authors declare that this study complies with Research and Publication Ethics.

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