ASEE 2022 ANNUAL CONFERENCE
Excellence Through Diversity
MINNEAPOLIS, MINNESOTA, JUNE 26TH-29TH, 2022 ASEE
Paper ID #37618

Students Poor Exam Performance in an Engineering Course after Twenty Months of Online Instruction and Efforts to Improve

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Abstract

Many universities stopped face-to-face instruction in March 2020 due to the COVID-19 pandemic and forced courses to be online through the summer 2021. In the fall 2021, many students returned to face-to-face instruction. After the two face-to-face exams, nearly 60% of the class was failing a heat transfer class that is significantly higher than pre-pandemic semesters. The instructor offered to meet one-on-one with each student and two-thirds of the class did meet with the instructor. The instructor learned that many students (1) devoting less than 2 hours per week to the course outside class room, (2) do not read the textbook and (3) primarily study by reviewing instructor-provided notes the evening before the exam. The individual meeting helped build instructor-student connectedness and helped students develop a personal strategy to improve class performance. Many students responded positively and grades improved from 40% mid-term pass rate to 73% final course pass rate, yet this is about 20% lower than pre-pandemic pass rates. The improvement is largely attributed to improved student-instructor rapport and students being open to practical suggestions to help increase study productivity and improve student learning.

Introduction

In teaching thermal science courses for many years, the authors have observed gradual changes in students' study habits and use of learning resources like the textbook and the internet. In 1990s, most students attended classes, read the textbook, worked textbook example problems, and solved homework assignments on their own. The internet has had a profound impact on engineering education and the pandemic has accelerated changes in how students perceive the instructor, lectures, textbook, homework and exams [1]. Example of these changes is highlighted with respect to homework.

In the early 1990s, almost all textbook instructors' solution manuals were in print format and the solutions steps were very brief. By early 2000s, most solution manuals became available in digital format. The digital format, made it easy for one student who had gained access to a solution manual to distribute it to others. Several studies [2]-[8] have examined the effects of students' use of solution manuals on their performance during exams. One study [2] had concluded that many instructors have ethical concerns regarding the students' use of solution manuals, while many students do not consider the use of solution manuals as scholastic dishonesty. Few other studies [3]-[6] have indicated that the use of solution manual adversely affects students' learning. Others [7]-[8] have proposed new strategies for assigning homework problems. Textbook publishers have tried to create unique problem numbers for each student to reduce copying [9].

With the availability of solution manuals to students, the authors observed over time an increase in the rate of unsuccessful grades (DFW) in their courses [1]. Also, a wide range of grade distribution observed for each exam spreading from grades as low as zero (0) to as high as 100. Now all solution manuals are available on the Internet. In spring 2009 only 44% of students in a second course in thermodynamics (Thermodynamics-II) received passing grades of C or higher.

To address this problem, the authors created unique homework problems and found they had a positive effect on student success for a few years. However, in a short time a number of on-line tutorial services, such as Chegg [10] and Course Hero [11], became available. For a subscription cost, students can submit an engineering problem and receive a solution, typically within a few minutes. Likewise, students were not purchasing nor reading the textbooks. To address this problem, we experimented with the Flipped classroom concept [12]. Students were give assignments that included reading textbook materials and reviewing lecture slides/video tapes of lectures from previous semesters before attending lectures. The idea was to use most of the class time for students to solve problems. Unfortunately, this scheme had limited success since many students came to class unprepared.

In the fall 2018, the university "Instructor-Initiated Drop policy" was adopted and implement in three different courses [13]. The policy allowed the instructor to drop students who had missed a predetermined number of lectures, or failed to submit assignments. This resulted in an improvement in course grades primarily because class attendance improved and the requirements for submitting the homework solutions. The passing rate in Thermodynamics-II increased from 53% in spring 2015 to 79% in fall 2018. For the Heat Transfer course, the passing rate increased from 65% in fall 2015 to 82% in fall 2019.

Student performance during on-line instruction

In March 2020, the University suspended in-person face-to-face instruction due to the COVID-19 pandemic and online instruction and assessment was required for the rest of semester. The online instructions continued until the summer of 2021, which is about 20 months. The COVID 19 and online instruction created challenges for both the students and the instructors. The pandemic had adverse psychological effects on some students. It also created financial stress for some students and their family. A significant challenge for instructors during the online courses was to engage students in online activities, especially in classes with large enrolment. Instructors often are unable to see student faces to determine whether they are following the lecture on not. In responding to students' questions, the instructor had more difficulty to write equations on PowerPoint slides, unless a tablet was being used. Even with tablets, it was more difficult to present long example problems and harder to respond to students' questions. Both students and the instructor encountered difficulties with internet connection during the online instruction period. We had presented some of these challenges in an earlier study [14]. The study described the approaches adopted for delivery of live online lectures, and the tools and methods used for conducting exams.

Exams

The greatest challenge for online courses is maintaining academic integrity. We have observed a increase in cheating, even prior to the required online instruction and assessment [15]-[16]. Examples of scholastic dishonesty had included copying solution manuals for homework assignments, using phones, text, and apps to share answers; using phones to take images of exam questions, sending them to external tutoring services, and copying solutions received from the external tutoring services. Some of the department faculty members have identified such cheating

methods and have penalized students who had copied solutions received from such tutoring services (e.g., Chegg [10]).

In spring 2020, the authors conducted their first face-to-face exams on campus. After going on-line instructors had limited options for proctoring exams [1, 14]. The second midterm exams in Thermodynamics-II was online, using the Webex platform. When the instructor asked students to activate the video function of Webex while taking the exams, some indicated that they did not have a camera on their computer. One student, who received the lowest grade in the first exam which was face-to-face, received a perfect score on the second exam which was online. Also, the camera could only display the upper body of each student, but could not capture their activities on the computer. Therefore, students are suspected to have communicated with each other through email or seek assistance through on-line tutoring services.

Typical exams are closed book with equation sheet and property tables required for solving exam problems. In fall 2020 and spring 2021, the authors have used Proctorio software [17] to monitor students taking exams. Students were required to activate their external webcam during the exam. Students had to point their webcams to their desk working area, showing their hands, keyboard, mouse, calculator and portion of screen. Proctorio recorded student's activities during the exam. In addition, it recorded students' computer screen and kept a log of the internet navigation during an exam [14]. After the exam, the instructor had the ability of reviewing the recordings. However, in large classes, it took a long time to review the recordings for each student who took the exam. The use of Proctorio discouraged some students from cheating, but students quickly learned how to cheat on exams with Proctorio. Despite the faculty efforts, cheating in online course continues to be a significant problem, as the authors can find their exam problems posted on Chegg that only could have happened while students were taking the exam. Unfortunately, only a few instructors in the university chose to employ Proctorio to monitor their on-line exams. Others, replaced exams with projects, or gave exams, allowing somewhere between 24 hours to 7 days to complete the exams. None of these exams were proctored. From the way the student knowledge were assessed during the pandemic, it appears that some students have passed online courses with minimal understanding of the course topics.

Instructor Initiated Drop policy

Since spring 2020, the instructors were unable to enforce the Instructor Initiated Drop policy, since the University voided this policy for practical reasons. As described earlier, this policy improved the student attendance and success before the start of the pandemic. The change in policy was one of the significant factors that adversely affected student performance in the courses taught by the authors.

Comparison student performance in exam, prior to, during, and after online instruction

In fall 2021, most classes returned to in-person activities. We observed that abnormally high number of students struggled academically due to lack of sufficient knowledge in prerequisite topics. Therefore, the rate of unsuccessful attempts (grades of D or F or W) increased. Tables 1 and 2 present the rates of ABC and DFW grades given in Thermodynamics-II and Heat Transfer

course, respectively, for few semesters, prior to covid pandemic, during the on line instruction and after returning to in person instruction.[1]. Either the same instructor taught both sections of these courses, or two different instructors taught two sections of the same course in one semester. In the cases when two different instructors were teaching two sections of the same course, both sections used a common course syllabus, employing the same grading policies. In addition, students took common exams given outside of the regularly scheduled class time for each section. Both instructors shared the responsibilities of grading the exams for both sections and each instructor graded the same problem on the exams for both sections.

Table 1. Comparison of student passing rates in Thermodynamics-II course offered in five different semesters under various circumstances [1]

Semester	Number of sections	Total enrollment	ABC rate	DFW rate	Drop policy	Exam mode	Instructors
Fall 2015	2	156	53%	47%	No	Common, in person	Different
Spring 2016	2	157	62%	38%	No	Common, in person	Different
Fall 2018	2	127	79%	21%	Yes	Common, in person	Same
Spring 2020	2	92	70%	30%	No	Common online not proctored	Same
Spring 2021	1	43	56%	44%	No	Online-Proctorio	One section

Table 2. Comparison of student passing rates in sections of Heat courses offered in four different semesters under various circumstances [1]

Semester	Number of sections	Total enrollment	ABC rate	DFW rate	Drop policy	Exam mode	Instructors
Fall 2015	1	52	65%	35%	No	In person	One section
Fall 2019	2	107	82%	18%	Yes	Common, in person	Same
Fall 2020	2	101	76%	24%	No	Common, Online Proctorio	Same
Fall 2021	2	87	73%	27%	No	Common In person	Same

A few years prior to 2015 passing rates in Thermodynamics-II were in a range of 80 to 90%. The data presented in Tables 1 and 2 for Fall 2015 and spring 2016 represent a period of declining passing rates that started a few years earlier. During this period, many students stopped reading the textbook, reviewing the textbook example problems, and using solution manuals when solving homework assignments, or not solving the homework assignments at all. In addition, student attendance in large classes was dropping during that period. Some students were relying on lecture video tapes available on the internet, but they were not aware of the materials covered in the class. With the implementation of the Instructor Initiation Drop policy, in fall 2018, attendance improved and most students completed their homework assignment. With the COVID pandemic and the

requirement for offering online instruction and conducting exams online, instructors could no longer employ the Instructor Initiated Drop Policy. Table 1 shows decreasing pass rates in Thermodynamics-II courses in spring semesters 2020 and 2021.

Table 2 displays passing rate results in Heat Transfer courses that are very similar to those presented in Table 1 for Thermodynamics II. After the start of online instruction, it became apparent that many students had shortcomings in the knowledge of prerequisite topics in order for them to follow and understand the materials covered in courses. For example, when the conduction was being covered in the heat transfer course, some students could not solve a simple second order ordinary differential equation such as:$d^2T/dx^2 = constant$ even though a course covering differential equation is a prerequisite for the course. This required the instructor review the prerequisite topics before starting to lecture new topics in the course. Therefore, the instructor could not introduce all the course topics covered in the past, but could focus only on the most important topics in the course.

Assessment of student performance in the Heat Transfer course in fall 2021

Two sections of Heat Transfer course, taught by the same instructor, was offered, in fall 2021. Forty-seven (47) students were enrolled in section 1 and 40 students were in section 2, totaling 87 students in both sections.

Table 3 presents the evaluation areas and weights for assigning the final grade for the Heat Transfer course offered in fall 2021. Shorts quizzes were given on the topics covered during the lectures in order to engage students and find out if students understood the concepts covered. Students could earn up to 2% bonus points added to the total points earned in all areas of evaluation. Several in-class and take-home quizzes were given during the semester, which accounted for 12% of the final grade. These quizzes were given on the topics that was already covered in lectures and students had a chance to solve similar problems in homework assignments. Students had 15 to 20 minutes to solve in-class quizzes. The take-home quiz problems, created by instructor, were more challenging and required much more time. For take-home quizzes, students had to show all solution steps, including formulation of the problem, showing all relevant equations, inserting numbers and units in equations, and showing all required unit conversions.

The homework assignments had a weight of 10% on the final grade. Wiley-Plus was used for assigning homework problems. Weekly homework assignments included six to eight problems. Wiley-Plus system automatically graded homework assignments. Students were still required to submit a hard copy of their assignment showing all solution steps for each problem. The grader checked each submission for completeness and to see if the solutions were sufficiently detailed. Based on the quality of the submissions, students could receive up to 10 points for the hard copy of their solutions submitted for each homework set. Students could also receive up to 3% of bonus pointed added to their total points earned during the semester, if their average score for all exams was equal to or exceeded 70 points.

Table 3. Evaluation areas and weights for assigning final grades

Areas	Basis for final grade	Bonus
Attendance and Practice Quizzes		2%
Quizzes	12%	
Homework	10%	3%*
Design Project/Research Project(s)	8%	
Cumulative Midterm Exams	48%	
Final Exam	22%	
Total	**100%**	**5 %**

* For an average exams grade above 70 points during the semester, up to 3 bonus points will be awarded based on the total points earned for homework assignments.

Three-midterm exams accounted for 48% of the final grade and the final exam had a weight of 22% on the final grade. As a part of exam policy, the lowest mid-term exam grade was replaced by the average of all other exam grades, including the final exam. For example, if the mid-term grades for a student were: 50, 75, 85, and the final exam grade was 86 then 82 replaced the 50 grade because (75+85++86)/3 = 82. In addition, if a student missed a midterm exam for any reason, a grade of zero (0) was assigned for that exam, but that grade was replaced with the average of the other three exams. For example, if a student missed the third exam for any reason (excused or unexcused) and had mid-term exam scores: 90, 80, 0, and the final exam was 79, then the zero (0) grade was replaced by 83 because (90+80+79)/3 = 83.

The design project had a weight of 8% on the final grade. A group project was assigned during the semester that was due near the end of semester. The procedure described in [18] was used to form the design teams. The team leaders were selected based on the students' performance in the first two exams. Students having higher average scores in the first two exams were selected as team leaders. All other students were asked to identify three team leaders as their first, second, or third choice. The instructor formed the teams by honoring student choices for team leaders as much as possible and maintaining balance of talent among design teams, such that each team included students who had low average grades in the first two exams as well as those who received higher scores.

A few days after returning to face-to-face instruction, an exam was given to students in both sections of course. A large number of students performed poorly in the first exam; approximately 30% of students received grades of less than 70 out of 100 possible points. The grades were ranging between 27 and 100 points. At first, the thought was that student performance on the second exam will improve, due to face-to-face instruction. After the first exam, students were reminded about the grading policy that the lowest midterm grade can be replaced with the average of the other three other exams. Therefore, those with low grades in the first exam should work to earn higher grades in the remaining exams. They were also encouraged to attend the three recitation hours per

week offered by the teaching assistant and the instructor. The teaching assistant solved additional example problems during the recitation hours, and the instructor answered student questions about the course material and homework assignments. Students were also encourage to meet the instructor during the office hours to resolve any difficulties they had with the course material. However, the student performance on the second exam ended up to be worse than the first exam. Few students performed better on the second exam, but many received grades lower than their first exam. The grades in the second exam were in a range from 11 to 99 points and over 70% students received grades of less than 70 points. The average grades on the two exam was in range from 33 to 98 points and 59% of students had average scores of less than 70 in the two exams.

The grade distributions for the first and second exams are presented in Figures 1 and 2, respectively. The figures also display the minimum and maximum grades, median, mean, and standard deviation for each exam and each section. There were 110 possible points on each exam, allowing 10 points curve for each exam in advance. The actual points earned by each students were record based on 100 possible points. For example, if a student scored 85 points out of 110 point, it was recorded as 85/100. Four students did not take the first exam and three did not take the second exam. The average grades of the first two exams for all students in both sections were in a range from 33 to 100; the median, mean, standard deviations were 68, 56, and 17, respectively.

The instructor asked to meet with students that received average scores of less than 70 in the first two exam to find out why they were struggling in the course. Any other student was also welcomed to schedule a meeting the instructor. Fifty-two (52) students had received average scores of less than 70 points in the first two exams. Fifty-eight (58) students, including 41 students who received average scores of less than 70 points, scheduled meetings with the instructor. Each meeting lasted 15 to 20 minutes. The instructor asked a few questions to learn how students were studying for the class. When the instructor asked the students if they read the textbook or reviewed example problems in the book, before attempting to solve homework assignments, most responded negatively. Some indicated they looked through the book when they were solving homework assignments. Most indicated that they only review the lecture materials posted on line when they were solving the homework problems. When the instructor asked if they do their weekly homework assignments, most responded yes. Then, when the instructor asked on the average how much time they devote to the heat transfer course outside classroom, many indicated one or two hours. These answers were surprising to the instructor, since approximately 6 to 8 homework problems were assigned each week and one or two hours is not sufficient to honestly complete the problems.

After talking one-on-one with many students, it became obvious that during the pandemic things had been made too easy for students to pass important prerequisite classes. Their understanding of important concepts was not assessed properly in order to pass these courses. In general, the instructor advised students that they need to spend more time and effort to study for the course. Students were advised to read the textbook and try to solve example problems on their own, before attempting to solve homework problems. Doing poorly on the first two exams didn't doom the semester since the exam policy allowed the lowest midterm exam to be replaced with the average

of the other three exams, including the final exams. The instructor also provided an additional incentive to encourage students to put more effort in studying for the course. The instructor told the students, if they follow his advice and score more than 70 points in the next two remaining exams, then 5 points would be added to the second lowest midterm exam. In addition, in order to improve student attendance and engage student in class activities, the instructor increased the frequencies of pop quizzes during the lectures. Nearly a pop quiz was given during each lecture, requiring 5 to 10 minutes to complete the quiz.

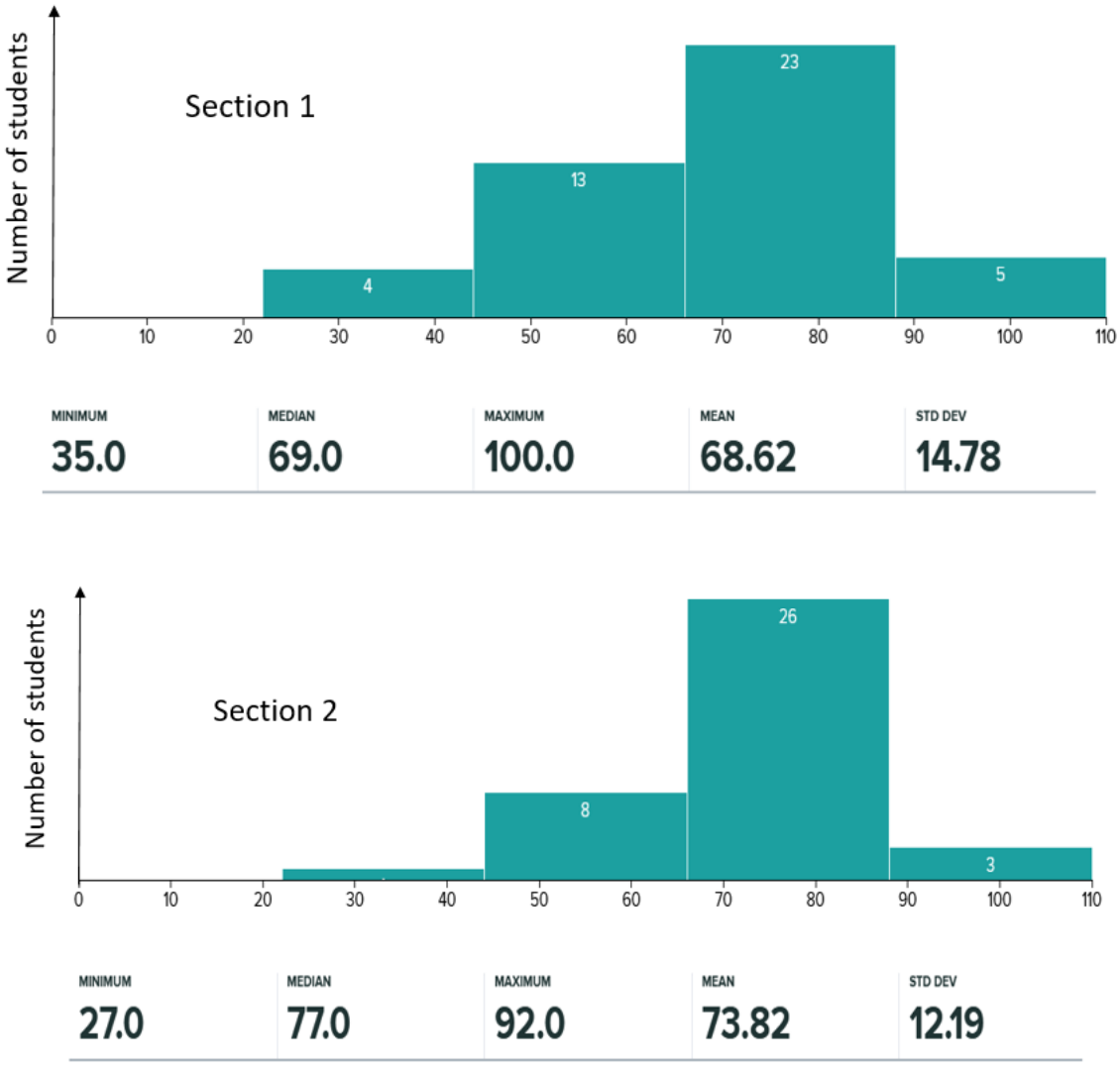

Fig. 1. Grade distribution for the first exam in two sections of Heat transfer course, fall 2021

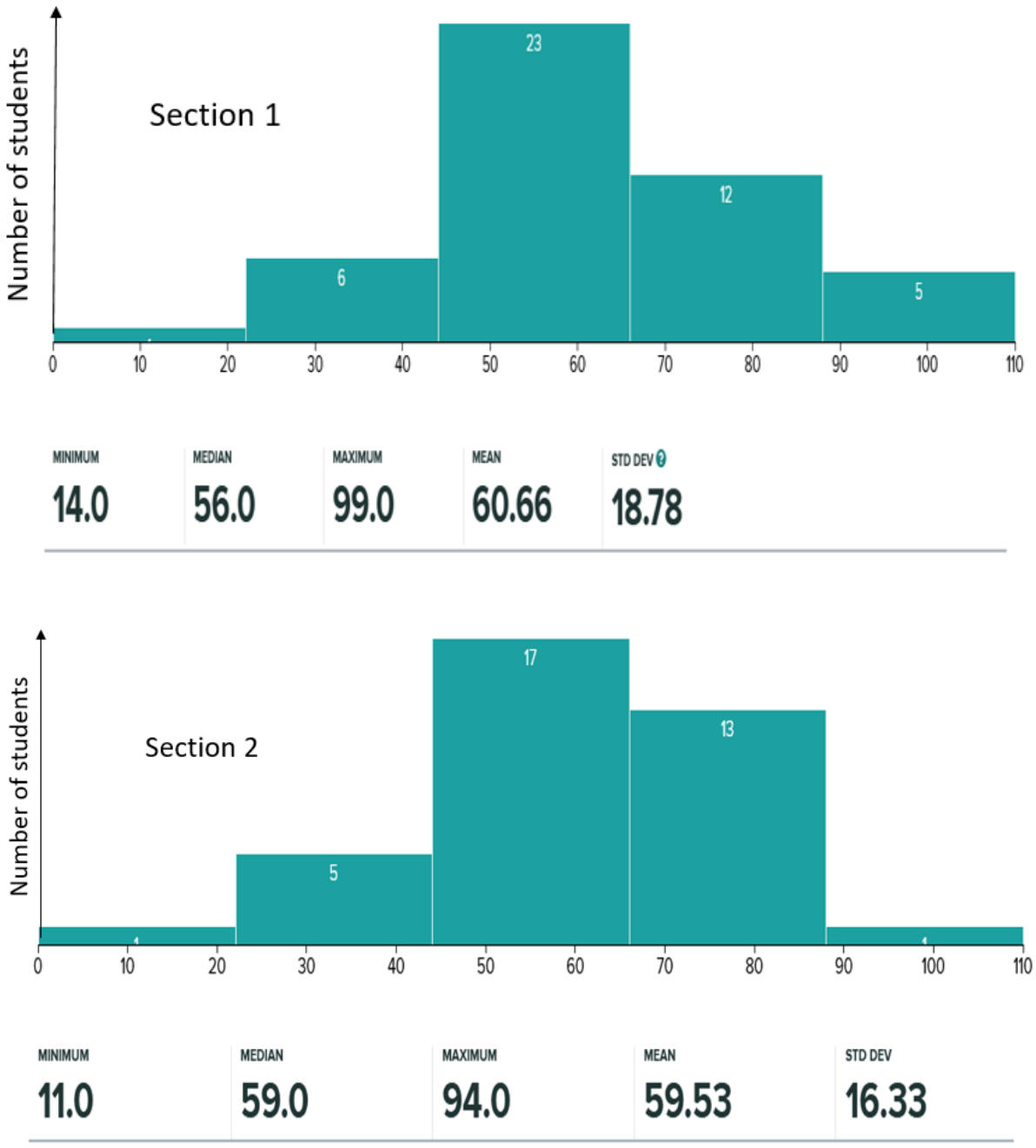

Fig. 2. Grade distribution for the second exam in two sections of Heat transfer course, fall 2021

Some students followed the instructor's advice and as a result, passing rate increase from 41% after the second exam to 73% at the end of semester. Fifty-two (52) students were at risk of failing the course after the second exam. Thirty (30) of those students performed better in the remaining two exams and were able to pass the course. It should be noted that easier exams were not given

for the third or final exams. Five points were added to the second lowest midterm exam, only if students received an average scores of 70 points or above in the third and the final exam.

Table 4 provides a list of students who were at risk of failing after the second exam, but improved their performance in the two remaining exams to pass the course. The data in the table shows that one student who had an average score of 42 for the first exams was able to pass the course with a grade of C. A few students whose average grades for the first two exam were within the range of 50 to 59 were able to improve their performance in the two remaining exam and receive final grades of B- or B. Three students whose average grades for the first two exam were within the range of 60 to 69 were able to receive grades of A- or A. Twenty-eight students listed in Table 4 met the instructor after the second exam, but two did not. Two students who received grades of F and W did not take any of the exams. One withdrew from the course after the census date and the other stop to participate in any class activity after the census date. The University policy does not allow students to drop courses when they have received six (6) grades of W grades in previous courses.

An optional survey was conducted to learn about student's workload and their time and effort spend in the Heat Transfer course and other engineering courses. Two bonus points added to the final exam in order to increase participation. Seventy-four (74) students responded to survey. The first four questions were related to students' workload and the average time they spent each week outside classroom for the Heat Transfer and other courses. Table 5 provides a summary of responses in this area. The data in table 5 shows that 64 students were taking at least 10 semester credit hour (SCH) of course work; 26 students were spending 4 or less hours each week studying for the heat transfer course; 34 students were spending 4 or less hours each week studying for each of other engineering courses; 41 students work for a job at least 15 hours per week. During the individual meeting with the instructor after the second exam, most students were indicating that they were spending one or two hours per week studying for the course. The survey indicated that 48 out of 74 students of student were spending at least 4 hours per week studying for the course.

The next seven questions on the survey are related to class attendance. Students were asked to express their level of agreements with each statement on the survey questionnaire as defined as SD – strongly disagree, D – disagree, N – neutral, A – agree, SD – strongly agree. Table 6 provides the results of the responses in this area. After responding to the first questions in this area, students were asked to respond to the remaining question regarding on the reason why there were not attending classes on a regular basis. The agreement level is the weighted average of numerical values assigned to letter agreement level. Most student indicated that they attended most of the lectures. For those who had missed classes more often, the family conflict or poor time management were the most dominant factor.

The remaining questions on the survey questionnaire related to whether students were reading the textbook or resolving the example problems in the book. Table 7 provides a summary of students' responses to questions in this area. The majority of students stated that they read the book and resolved the example problems before attempting homework problems. This contradicted what the instructor heard from students after the second exam. The possible reasons for the contradictions

might be that the instructor met mostly with low performing students after the second exam and the possibility of students changing their study habits as the result of that meeting. Five students indicated that they hardly read the book and seven other students indicated that they were not reading the book on a regular basis.

Table 4. List of 30 students who were at risk of failing after second exam but improved their exam performance to pass the course

No	Class section	Exam 1	Exam 2	Average of two Exams	Met the Instructor	Final Grade
1	1	49	34	42	yes	C
2	2	63	37	50	yes	C-
3	1	43	58	51	yes	C-
4	1	71	37	54	yes	C-
5	1	66	44	55	yes	C
6	1	59	53	56	yes	C-
7	1	65	49	57	yes	B-
8	1	65	50	57	yes	C
9	2	59	57	58	yes	B-
10	1	76	41	59	yes	C-
11	2	72	46	59	yes	C-
12	2	74	44	59	yes	B
13	1	80	42	61	yes	C
14	2	80	42	61	no	C-
15	1	70	53	62	yes	C
16	1	79	44	62	yes	C
17	2	70	53	62	yes	C
18	2	85	40	63	yes	B-
19	1	76	54	65	yes	A-
20	1	69	62	65	yes	B-
21	2	56	75	65	yes	B-
22	2	73	60	67	yes	B-
23	2	81	52	67	yes	A
24	2	77	57	67	yes	C-
25	1	79	56	68	no	C
26	2	78	59	68	yes	B-
27	2	63	74	69	yes	A-
28	1	64	74	69	yes	B
29	2	69	69	69	yes	B
30	2	77	61	69	yes	B

Table 5. Student workload and course effort survey results.

Survey questions	a	b	c	d	e	n
How many semester-credit-hours (sch) did you take this semester including this class. (a) 3 sch (only this class) (b) 4-6 sch (c) 7-9 sch (d) 10-12 sch (e) 13+ sch	1	6	3	28	36	74
On average, how many hours per week did you study for this class? (a) 0-1 hr/wk (b) 2-3 hr/wk (c) 3-4 hr/wk (d) 4-5 hr/wk (e) 5+ hr/wk	0	7	19	18	30	74
On average, how many hours per week did you study for each other engineering class (not including this class and not for laboratory classes)? (a) 0-1 hr/wk (b) 2-3 hr/wk (c) 3-4 hr/wk (d) 4-5 hr/wk (e) 5+ hr/wk	3	15	16	20	20	74
On average, how many hours per week did you work (both paid and volunteer)? (a) 0-4 hr/wk (b) 5-9 hr/wk (c) 10-14 hr/wk (d) 15-19 hr/wk (e) 20+ hr/wk	21	6	6	19	22	74

Table 6. Class attendance survey results.

Survey questions	SD =1	D =2	N= 3	A= 4	SA=5	Agreement level	n
You attended all of the face-to-face lectures in this class this semester.	1	6	9	21	33	4.13	70
If you answered either SD/D/N for the above question, why did you miss face-to-face class meetings?							
COVID (sick from or isolating because of exposure to COVID)	7	2	3	4	4	2.8	20
concerned about contracting COVID	7	3	1	4	2	2.47	17
family time conflicts (caring for child, spouse, parent, …)	5	3	4	7	5	3.17	24
job time conflict	7	3	2	5	2	2.58	19
poor time management	5	3	5	4	3	2.85	20

Summary and Conclusions

This paper describes changes in student study habits and academic performance, especially as it has been impacted by the covid pandemic when courses were forced online for 20 months. With the return to face-to-face classes in fall 2021, it appears students learning was not being assessed properly in online classes during the pandemic and some students have passed important prerequisites courses with minimal learning. After returning to face-to-face instruction, the failure rate in a heat transfer course after the first two exams was 60% compared to typical pre-pandemic failure rates in the range of 20%. The instructor had individual face-to-face meetings with 67%

of the class to understand the reason for poor exam performance. It was found that many students (1) spend less than two hours per week studying for the course, (2) do not read the textbook, and (3) primarily study the instructor-provided notes the day before the exam. The instructor recommended corrective actions and many students adjusted their approach to the class. As a result, 73% of the students were able to pass the course, which is a significant improvement above mid-term performance, yet is about 20% lower than pre-covid pass rates for the class. Easier third mid-term and final exam were not given in order to increase the passing rate. Overall student learning has suffered during the covid forced-online classes. The followings are some of the possible reasons:

- Pandemic had adverse psychological effects on the motivation of some students
- Pandemic caused financial stress for some students
- During pandemic, it was difficult to build instructor-student connectedness in online classes
- Instructor was unable to see students to determine whether they are following the lecture on not
- Poor internet connections during the online instruction period
- Inability to enforce the instructor-initiated drop policy
- The ways the student knowledge was accessed in prerequisite courses.

This paper found that individual face-to-face meetings with as many students as possible (2/3 of class chose to meet with the instructor) helped motivate students and foster connectedness between the instructor and students. Practical strategies were shared to help increase study productivity and help improve student learning.

Table 7. Textbook survey results.

Survey questions	SD =1	D =2	N= 3	A= 4	SA=5	Agreement level	n
You read the textbook before solving homework problems.	3	5	19	27	20	3.76	74
You resolved the textbook example problems before solving homework problems.)	1	10	22	28	13	3.57	74
You read the textbook before primarily before exams.	2	5	11	32	24	3.96	74
You didn't read the textbook	40	21	7	1	4	1.74	73

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