

Implementation of Instructor-Initiated Drop Policy after COVID Pandemic Period to Improve Student Learning and Success

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Abstract

The easy access to solution manuals, on-line tutoring services, spending little time in reading the textbook materials, not studying the textbook example problems, not attending scheduled classes, not solving homework problems, and grade inflation have all been the contributing factors to gradual decline in student learning. As a result, the passing rates in required upper-division undergraduate courses gradually decreased from 85-90% to 55-60 % in large classes. In 2016 the university established an “Instructor-initiated Drop policy”. The policy allows instructors to drop those students who exceeds the absence or missed assignment limits for the class described and specified in the course syllabus. The newly established “Instructor-initiated Drop policy” was adopted and enforced in three different courses taught from fall 2018 through fall 2019 semesters. The policy improved class attendance, completion of homework assignments, and student pass rates. During the COVID pandemic the university suspended the “Instructor-initiated Drop policy” and did not re-initiated it until fall 2022. In teaching upper division courses in fall 2021 and spring 2022, not only we noticed students’ lack of commitment in attending lectures or doing their homework assignments, but also observed that many students lacked the knowledge of prerequisite topics in courses they passed during COVID. As the result, in fall 2021, over 52% of students had an average grade of less than 70% in the first two mid-term exams in an undergraduate heat transfer course. In fall 2022, the “Instructor-initiated Drop policy” was implemented in two sections of the heat transfer course. The enforcement of this policy vastly improved students’ class attendance, completing the homework assignments, and performance in exams, resulting in an improved passing rate of 78%. This paper describes the implementation of “Instructor-initiated Drop policy” in fall 2022 semester, the level of student success, and lessons learned.

Introduction

The authors through their teaching experience in many years have noticed a gradual decline in students’ deep grasp of course material. The easy access to solution manuals, on-line tutoring services, spending little time in reading the textbook, not reviewing the textbook example problems, being absent in lectures, not solving homework problems, and grade inflation have been the contributing factors to gradual decline in student learning. We have taken steps to address some of these challenges in the past and reported on our efforts in the proceeding of engineering educational conferences [1-8]. From 2010 through 2017, we observed that many students were absent during lecture periods and were not completing their assignments. As a result, the passing rates in the undergraduate required upper-division courses gradually decreased from 85-90% to 55-60 % in large classes. In 2016, the university established an “Instructor-initiated Drop policy”. The policy allowed instructors to set limits on the number of times a student can be absent or miss assignments and drop those students who exceeded those limits from the course. We adopted and enforced this policy in three different courses taught from fall 2018 through fall 2019 semesters [9]. This policy improved students’ class attendance, completion of homework assignments, and the course passing rates. While the drop policy was in effect, very few students were dropped from those three courses. The enforcement of the drop policy in those courses improved the passing rates from 55-60 % in most recent years to 80-85%. During the COVID pandemic, all classes

were conducted online from March 2020 through August 2021. The university suspended the “Instructor-initiated Drop policy” and did not re-initiated it until fall 2022. In teaching upper division courses in fall 2021 and spring 2022 we again noticed that many students lacked commitment to attend lectures or solve their homework assignments. Making the situation worse, we noticed that many students lacked the knowledge of required prerequisite topics in courses they passed during COVID pandemic period. As the result, in two sections of heat transfer course taught in fall 2021, over 50% of students had average grades of less than 70% in the first two mid-term exams [10, 11]. From spring 2020 through summer 2022, most instructors were soft in assessing student knowledge due to COVID pandemic. During this period, students took most exams online without an effective proctoring system. Moreover, in many cases take-home exams or projects employed to assess students’ knowledge. The greatest challenge for instructors was to maintain the academic integrity of their exams [12, 13]. Many instructors could find the solutions to their online exams, take-home exams, or projects on such online tutoring services as Chegg or Coursehero [14, 15].

Instructor Initiated Drop policy

In fall 2022, the university again allowed the instructors the option of implementing the “Instructor-initiated Drop policy” in their courses, as long as the criteria for the implementation of policy fully stated in the course syllabus. We chose to use the policy in two sections of our undergraduate heat transfer course taught in fall 2022. The aim was to improve student success in two sections of the heat transfer course offered in fall 2022 as compared with the similar sections offered in fall 2021. The courses syllabus for both sections contained the following statements:

“This course enforces the University “Instructor-Initiated Drop Policy” for students who exceed the absence or missed assignment limits. The instructor will drop those students from the course who exceed either of the following limits:

- a) Being absent four (4) times. Arriving 5 minutes after the start of class or leaving before the end of class will be considered being absent.
- b) Missing three (3) assignment sets (include Wiley Plus Homework sets, other assignment sets, take home quizzes, etc.). Attempting less than 75% of problems in each problem set, is considered missed assignment in this policy.

The Instructor-Initiated Drop Policy is in effect through the last day that a student may drop themselves from the course (October 24th for the fall 2022). Students will receive one courtesy warning when approaching the absence/missed assignment limits. Notification will be sent via Automated Student Access Program (ASAP) to the student’s preferred email address.”

In fall 2022 the instructor dropped two students from the course based on the Instructor-initiated Drop policy.

Comparison of students’ performance in heat transfer exam in fall 2021 and fall 2022

In fall 2021, after three weeks of online instructions, most classes, including the heat transfer, returned to campus for face-to-face (F2F) activities. In fall 2022, the heat transfer course conducted in F2F mode for the entire semester. Two sections of heat transfer course offered in fall 2021 and again two sections of the same course offered in fall 2021. The same instructor taught the course in both semesters. In fall 2021, the first section of the course had an enrollment of 47 students and

the second section had an enrollment of 40, totaling 87 students in both sections. In fall 2022, the first section had an enrollment of 52 student and the second section had an enrollment of 20, totaling 72 students in both sections.

In both semesters, almost the same grading policy employed for student assessment. Table 1 presents the evaluation areas and weights for assigning the final grade for the Heat Transfer courses offered in fall 2021 and fall 2022, respectively. As shown in Table 1, in fall 2022, two minor changes made on the weights of two assessment areas: The weight for quizzes decreased from 12% in fall 2021 to 10% in fall 2022 and the weight for final exam increased from 22% to 24%. In both semesters, 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 in the lecture. Students could earn up to 2% bonus points in this area, which was added to the total points earned in the semesters. Several in-class and take-home quizzes were given during the semester, which accounted for 12% of the final grade in fall 2021 and 10% in fall 2022. These quizzes were given on the topics that 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 the equations, and showing all required unit conversions.

Table 1. Evaluation areas and weights for assigning final grades

Areas	Basis for final grade Fall 2021	Basis for final grade Fall 2022	Bonus
Attendance and Practice Quizzes			2%
Quizzes	12%	10%	
Homework	10%	10%	3%*
Design Project/Research Project(s)	8%	8%	
Cumulative Midterm Exams	48%	48%	
Final Exam	22%	24%	
Total	100%	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.

The homework assignments had a weight of 10% on the final grade. Wiley-Plus [16] 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 to see if the solutions were sufficiently detailed. Based on the quality of the submissions, students could receive additional points for the hard copy of their solutions submitted for each homework set. Students could also receive up to 3% of bonus points added to their total points earned during the semester, if their average score for all exams was equal

to or exceeded 70 points.

Three-midterm exams accounted for 48% of the final grade and the final exam had weights of 22% and 24% on the final grade in fall 2021 fall 2022, respectively. 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 grade of 50 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 of 90, 80, 0, and a final exam grade of 79, then the zero (0) grade was replaced by 83 because $(90+80+79)/3 = 83$ [11].

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 by maintaining balance of talent among design teams, such that each team included students who had lower grades in the first two exams as well as those who received higher scores [17].

In fall 2021 approximately 30% of students received grades of less than 70 out of 100 possible points in the first exam and the grades were ranging between 27 and 100 points. Student performance in 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 those in 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 exams was in a range from 33 to 98 points. Fifty-two % (52%) of students had average scores of less than 70 in the two exams [11].

Because of such poor performance by a large number of students, those students who received average scores of less than 70 in the first two exams were asked to meet the instructor in order to find out why they were struggling in the course. Fifty-eight (58) students, including 41 students who received average scores of less than 70 points, met with the instructor for 15 to 20 minutes, each. After talking with students, it became obvious that many students were not putting sufficient effort in the course and were expecting to pass the courses by studying only a few hours before each exam. In addition, it was clear that that during the pandemic things were made too easy for students to pass important prerequisite courses. Students' understanding of important concepts were not assessed properly in order to pass prerequisite courses. The instructor advised students that they need to put more time and effort to study, in order to earn a passing grade in the heat transfer course. Students were advised to read the textbook and try to solve example problems in the textbook on their own, before attempting to solve homework problems. Students' attendance

and class participation was very low prior to second exam. In order to improve attendance and engage student in class activities, the instructor increased the frequencies of pop quizzes given during the lectures after the second midterm exam. Doing poorly in one exam did not doom the semester for many students, since the exam policy allowed the lowest midterm exam 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 students, if they followed his advice and scored more than 70 points in the remaining two exams, 5 points would be added to the second lowest midterm exam [11]. The same incentive was granted to student taking the course in fall 2022.

Table 2 presents the grade distributions for all the exams given in the heat transfer courses offered in fall 2021 and fall 2022. There were 110 possible points on each exam, allowing a 10 points curve in advance. The actual points earned by each student were recorded based on 100 possible points. For example, if a student scored 85 points out of 110 point, it was recorded as 85/100. Table 2 shows an improvement in students' exam performances for fall 2022, when the Instructor Initiated drop policy was in effect as compared to those in fall 2021, when such policy was not enforced. In all exams, higher percentage of students in fall 2022 received grades of over 80 as compared to those in fall 2021. Similarly, lower percentages of students in fall 2022 received grades of below 70 as compared to those in fall 2021. For the first exam, 61% of students received grades of over 80 in fall 2022 as compared to 34% of students in fall 2021, and 19% of students received grades of below 70 in fall 2022 as compared to 29% in fall 2021. For the second exam, 33% of students received grades of over 80 in fall 2022 as compared to 15% of students in fall 2021, and 52% of students received grades of below 70 in fall 2022 as compared to 70% in fall 2021. For the third exam, 51% of students received grades of over 80 in fall 2022 as compared to 37% of students in fall 2021, and 28% of students received grades of below 70 in fall 2022 as compared to 31% in fall 2021. For the Final exam, 57% of students received grades of over 80 in fall 2022 as compared to 30% of students in fall 2021, and 20% of students received grades of below 70 in fall 2022 as compared to 45% in fall 2021. Table 2 shows that for both in fall 2021 and in fall 2022 much lower percentages of students received grades of over 80 and much higher percentage of students received grades below 70 in the second exam as compared with other exams. The problems in the second exam were related to heat transfer by conduction, which required students' skills developed in such courses covering integral calculus and ordinary differential equations. In both fall 2021 and fall 2022, it was clear that most students had weak background in solving problems that requires integration or solving simple ordinary differential equations. The data in Table 2 for fall 2021 shows improved students' exam performance after the second exam, resulted from the instructor's individual meetings with the students receiving low grades in the first two exams.

For visual comparison, for each exam given in fall 2021 and fall 2022, respectively, the percentage of students receiving scores in grade ranges of < 60 , 60-69, 70-79, 80-89, and > 90 are presented in Fig. 1. Figure 2 displays a comparison of the average scores for each exam given in fall 2021 and fall 2021, respectively.

The University of Texas at San Antonio employs the following grading scales: A⁺, A, A⁻, B⁺, B, B⁻, C⁺, C, C⁻, D⁺, D, D⁻, F, IN (Incomplete), and W (Withdraw). In the mechanical engineering program, for all mathematics, sciences, and engineering courses, grades of C⁻ and above are considered a passing grade and grades of D, F, and W are considered unsuccessful attempt. For the University Core (general Education) requirements, Grades of D⁻ and above are considered as a passing grade.

Table 2. Comparison of exam performance by students enrolled in Heat Transfer courses in fall semesters of 2021 and 2022

Exams	Semester	# of exams	< 60	60-69	70-79	80-89	> 90	Ave	Std-Dv
Exam 1	Fall 21	83	16%	13%	37%	24%	10%	73.99	13.45
	Fall 22	69	13%	6%	20%	19%	42%	83.35	16.17
Exam 2	Fall 21	84	52%	18%	15%	10%	5%	60.16	17.70
	Fall 22	68	28%	24%	16%	21%	12%	62.89	17.03
Exam 3	Fall 21	82	20%	11%	32%	13%	24%	73.51	18.93
	Fall 22	65	11%	17%	22%	17%	34%	74.01	18.96
Final Ex	Fall 21	78	23%	22%	26%	17%	13%	70.95	17.59
	Fall 22	66	12%	8%	23%	24%	33%	78.14	17.29

Fig. 1 Percentage of students receiving scores within each grade range of < 60, 60-69, 70-79, 80-89, and >90 for each exam given in fall 2021 and fall 2022, respectively.

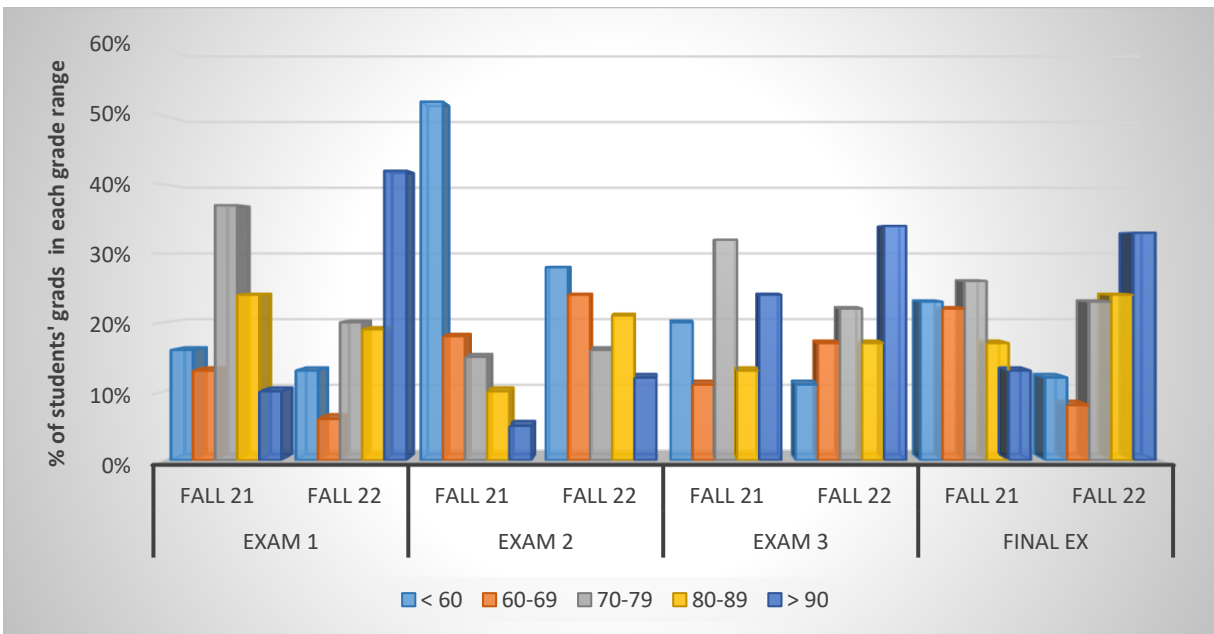


Figure 2. Comparison of average scores for each exam given in fall 2021 and fall 2021, respectively.

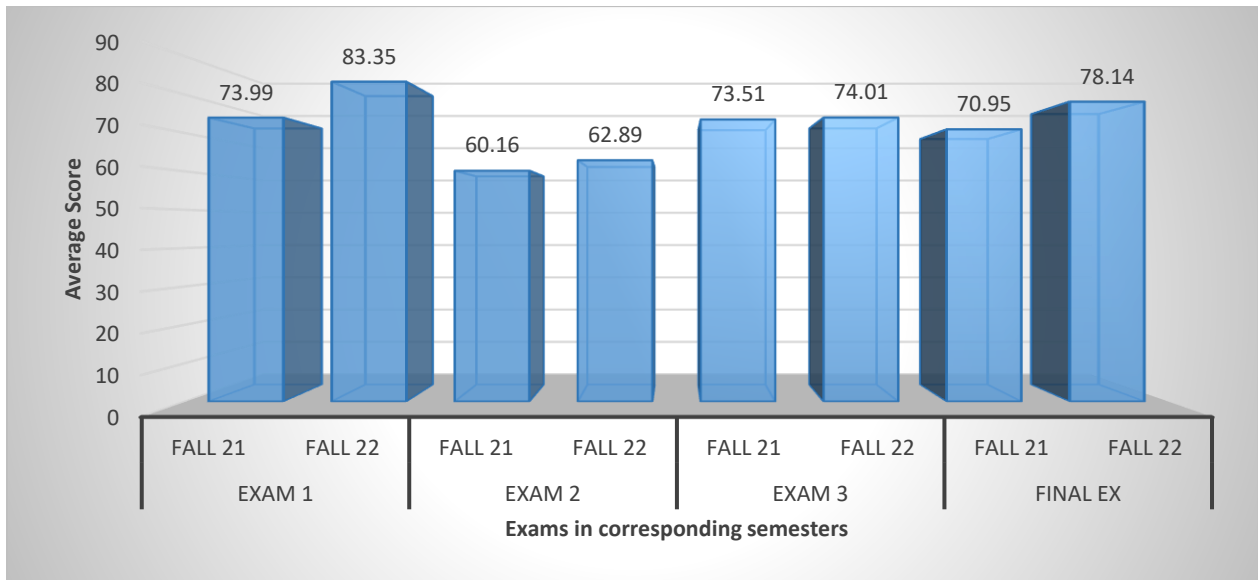
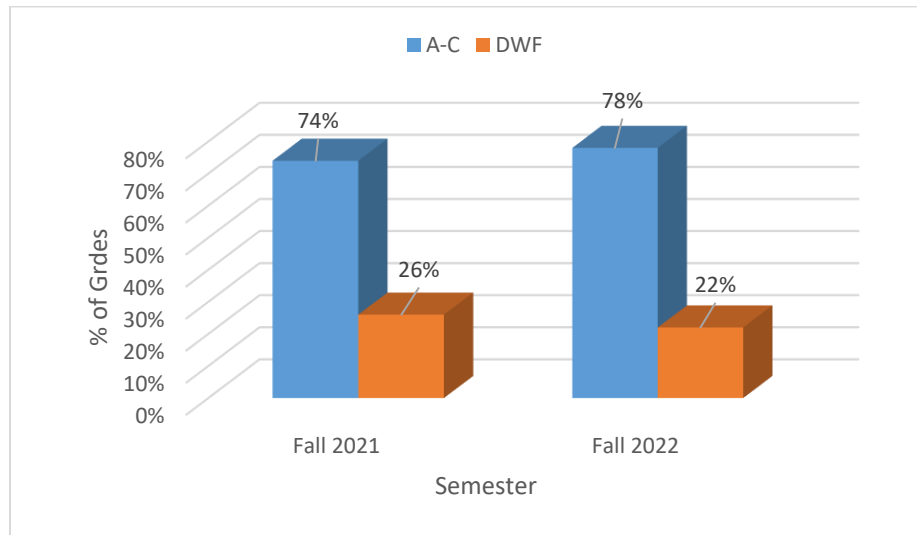


Table 3 provides a comparison of grade distribution in the Heat Transfer courses offered in fall semesters of 2021 and 2022. The same comparison is provided in a bar chart format in Fig. 3. The data in the table and the bar chart suggest a shift in grade distribution towards higher grades in fall 2022, due to implementation of “Instructor-initiated Drop policy. The passing rate increases by 4% in fall 2022. The greatest improvement was in the percentage of students receiving grades of A in fall 2022. Twenty eight percent (28%) of students in fall 2022 received grades of A+, A, and A- as compared to only 17% of students in fall 2021 receiving similar grades.

Table 3. Comparison of grade distribution in the Heat Transfer courses during fall semesters of 2021 and 2022

Semester	A	B	C	D	F	W	A-C	DWF
Fall 2021	17%	30%	26%	14%	11%	1%	74%	26%
Fall 2022	28%	25%	24%	13%	7%	1%	78%	22%

Fig. 4 Comparison of grade distribution in fall semesters of 2021 and 2022



Comparison of students' performance in two sections of heat transfer course in fall 2022

In fall 2022, the mechanical engineering program offered two sections of the heat transfer course taught by the same instructor. The first section had an enrollment of 52 students and met on Tuesdays and Thursdays from 11:30 am to 12:45 pm. The second section had an enrollment of 20 students and met on the same days from 2:30 am to 3:45 pm. A common course syllabus was used for both sections having the same grading policy. All the homework assignments and take-home quizzes were the same for both sections. Students in both sections took common exams, scheduled outside of the regular class periods, in a large auditorium. Table 4 provides a comparison of exam performance by students enrolled in each sections of the course. The data presented in Table 4 indicates that students in the first section of the course in general performed better in the exams as compared to those enrolled in the second section. With the exception of the final exam, the percentage of students receiving grades of over 90 was higher in section one than those in section two. In addition, in all exams, the percentages of students receiving scores less than 70 were lower in section one as compared to those in section two. For the first exam, the percentage of students receiving grades of less than 70 points was 16% for those in section one as compared to 28% for those in section two. For the second exam, the percentage of students receiving grades of less than 70 points was 46% for those in section one as compared to 67% for those in section two. For the third exam, the percentage of students receiving grades of less than 70 points was 25% for those in section one as compared to 37% for those in section two. For the final exam, the percentage of students receiving grades of less than 70 points was 20% for those in section one as compared to 21% for those in section two. Fig. 5 provides a visual comparison of students' performance in each section of course for each exam given in fall 2022. It shows the percentage of students in each section of course receiving scores in grade ranges of < 60, 60-69, 70-79, 80-89, and >90. Figure 6 displays a comparison of the average scores in each section of course for exams given in Fall 2022.

Table 4. Comparison of exam performance by students enrolled in two sections of a Heat Transfer courses in fall 2022

Exams	Section	# of exams	< 60	60-69	70-79	80-89	> 90	Ave	Std-Dv
Exam 1	001	51	8%	8%	25%	16%	43%	85.45	17.58
	002	18	28%	0%	6%	28%	39%	77.39	12.19
Exam 2	001	50	20%	26%	14%	26%	14%	64.10	17.28
	002	18	50%	17%	22%	6%	6%	59.53	16.33
Exam 3	001	46	9%	16%	20%	18%	41%	72.91	18.95
	002	19	16%	21%	26%	16%	21%	76.68	18.98
Final Ex	001	47	11%	9%	28%	23%	30%	81.21	16.94
	002	19	16%	5%	11%	26%	42%	70.54	18.15

Fig. 5. Percentage of students in each section of course receiving scores in grade ranges of < 60, 60-69, 70-79, 80-89, and >90.

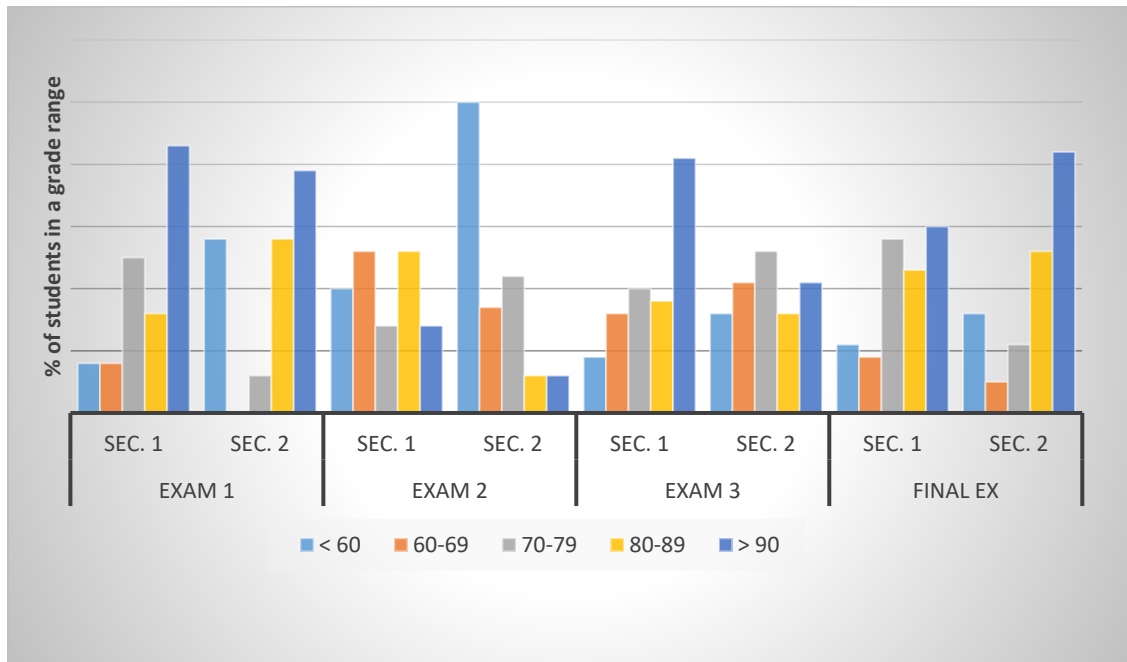


Fig. 6. Comparison of the average scores in each section of course for exams given in Fall 2022.

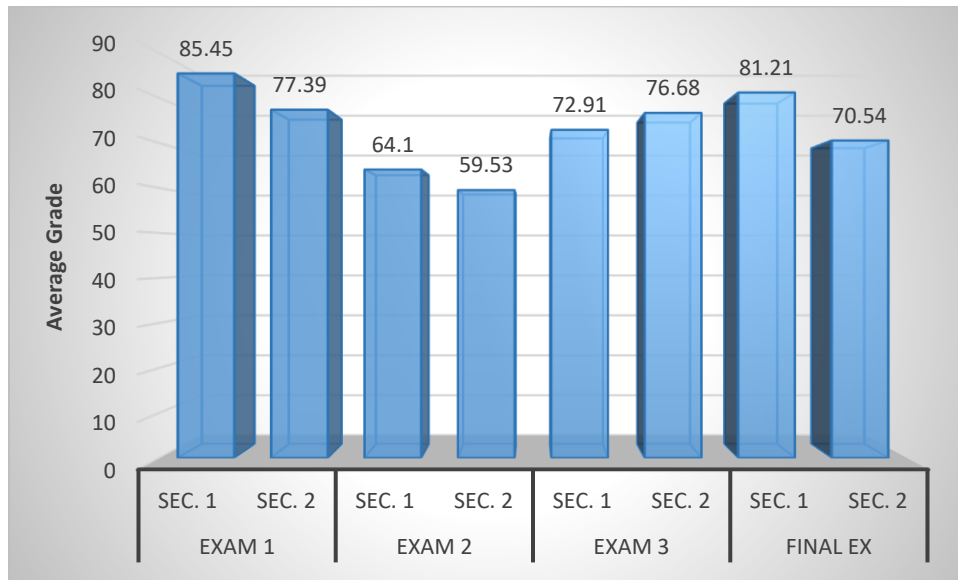


Table 5 and Fig 7 provide a comparison of grade distribution in two sections of the Heat Transfer course offered in fall 2022. They show a higher passing rate in section one. As the students in both sections had similar GPAs in the previously completed courses, one possible reason for the differences in exam performances and grade distributions can be attributed to student participation in class activities in each section. There were several motivated students in section one who always asked questions during lectures or volunteered to answer questions raised by the instructor. This helped other students in the class to understand the materials covered in lectures better. In the second section, very seldom any student asked questions about the course materials or volunteered to answer questions raised by the instructor. In this section, the instructor had to call upon individual students to answer questions in order to engage them in class activities. Similar differences were observed in two sections of a thermodynamics course taught in spring 2022 [18]. The first section of course was scheduled at 8:30 am and the section was scheduled at 11:30 am. In the first section very seldom, any student asked questions or volunteered to offer responses to questions posed by the instructor. That section had several motivated students who were asking questions or responding to the instructor's questions. The students' passing rate in the second section was 8 points higher than that of the first section. In the thermodynamic course, a second possible factor for the difference in student passing rate could have been the scheduled times of class meetings. The first section met in an earlier time of the morning, when higher percentage of students were absent.

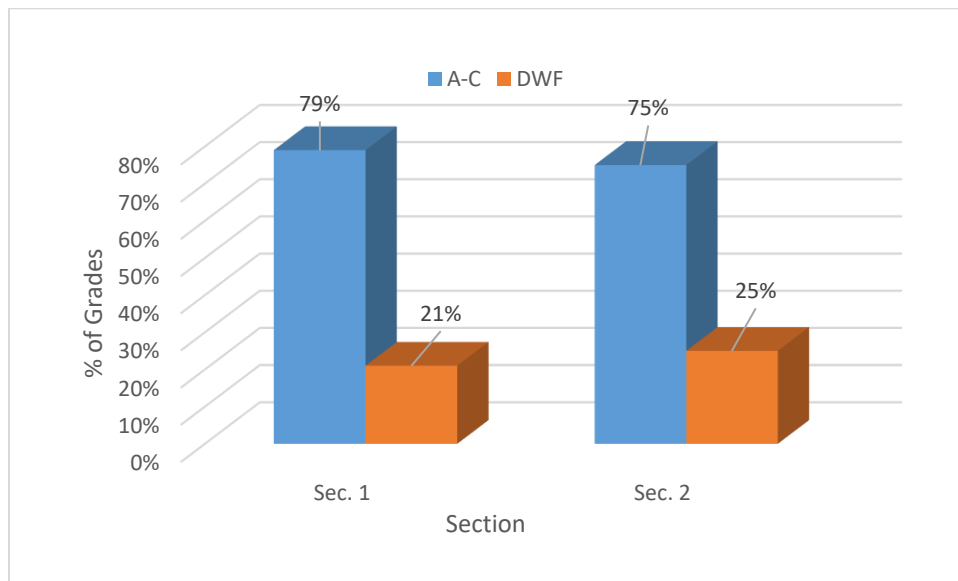
Teaching an undergraduate course in heat transfer has been a challenge after the COVID pandemic period due to students' weak background in prerequisite topics. To be able perform effectively in this course, it is expected that students have adequate background in mathematics (integral calculus and differential equation), thermodynamics (for conducting energy balance), and fluid mechanics (for understanding dimensional analysis, velocity boundary layer concepts). Because of student's

week analytical skills and lack of commitment for putting sufficient time and effort required to learn the new topics, in fall 2021, the instructor could cover only about 60% of the materials covered prior to the COVID pandemic period. In fall 2022, the instructor was able to cover more materials due to the implementation of the Instructor Initiated policy, but the coverage was still not to the extent of that of pre-pandemic era. In both semesters, students were introduced to all three modes of heat transfer: conduction, convection, and radiation, but the instructor had to skip some of the materials previously covered in each mode.

Table 5. Comparison of grade distribution in two sections of the Heat Transfer course in fall 2022

Sections	A	B	C	D	F	W	A-C	DWF
001	29.8%	19.1%	29.8%	10.6%	10.6%	0%	79%	21%
002	25.0%	40.0%	10.0%	20.0%	0%	5.0%	75%	25%

Fig. 7 Comparison of grade distribution in two sections of the Heat Transfer course in fall 2022



Summary

1. There has been a gradual decline in students' deep grasp of course material through the years caused by the students' easy access to solution manuals, on-line tutoring services, spending little time in reading the textbook materials, not studying the textbook example problems, not attending schedule classes, not solving homework problems, and grade inflation.
2. Many students miss lecture periods and do not complete their assignments, resulting in lower course passing rates.
3. "Instructor-initiated Drop policy" was adopted and enforced in three different courses taught from fall 2018 through fall 2019 semesters. The policy improved class attendance, completion of homework assignments, and student pass rates. The passing rates in these courses increased from 55-60 % to 80-85%.

4. During the COVID pandemic period, the university suspended the “Instructor-initiated Drop policy” and did not re-initiated it until fall 2022.
5. Upon returning to FTF instruction activities in fall 2021, we noticed students’ lack of commitment in attending lectures or doing their homework assignments.
6. After on line instruction during the COVID pandemic, many students lacked adequate knowledge in topics covered in prerequisite courses completed during COVID.
7. In fall 2021 over 50% of students had average grades of less than 70% in the first two mid-term exams in a heat transfer course.
8. Instructor could cover only about 60% of the materials covered before the COVID, because of student week background in prerequisite topics and study habits.
9. In fall 2022, the Instructor-initiated Drop policy was implemented in two sections of the heat transfer. Students’ class attendance, completing the homework assignments, performance in exams, and passing rate were vastly improved.
10. Comparing to fall 2021, in fall 2022, the instructor was able to cover more material, but still not as much as the pre-pandemic era, due to students’ week background.
11. During the semesters when Instructor-initiated Drop policy was enforced, the instructor had to drop very few students. In fall 2022 the instructor dropped only two students.

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