

Second Chance: A Path to Success

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Abstract:

The failure rate in the Math courses has reached alarming proportions. This is often attributed to the weak or non-existent pre-requisite Math skill sets in students. In this paper, we propose and present the results of a study to determine best practices in student success and retention: Can online modality be used as a platform, along with a prolonged time model to help an underprepared student to pass a course at their first try?

Introduction:

In recent years, we have been experiencing high failure rates in the Mathematics Courses. From the point of view of the Mathematics Department, it has been observed that the same placement tests that were administered a year or two ago are having increasingly many more students placed at entry-level math courses. This points to under preparedness in Math trending at admissions.

As more colleges look for avenues to tackle lack of math competency, a literature search reveals that there are different approaches to offering support to students. One angle is to tackle the problem at its core that is at the developmental stages [7,10,13,17,20,21,22]. However, given that this may be a deterrent for students because of huge investments in times and money [2,4,6,12, 18], other approaches are to think of remediation as a co-requisite task that goes hand in hand with the actual course work [1,14,17,23]. Embedded tutors, peer tutors [27], learning centers and boot camps prior to the start of a course [19], [16,25] are some such models. A comprehensive study of boot camps and universities that have used such strategies are presented in [8]. Other boot camp models are discussed in [8,11,24]. Bootcamp software packages [9,26] have made attempts at self-guided boot camps. A new model of Embedded Bootcamps was developed by this author described in [15] which has addressed the issue by bringing timely help to the students leading to increased student success.

Another way of tackling the issue is perhaps to think outside the box and combine traditional methods of remediation as in modular help, co-requisite help together with prolonged support beyond a semester to empower struggling students to complete the course.

Literature search reveals several traditional methods of remediation of interest that can be paired with the non-traditional idea to prolong a semester as an incentive to students who respond to methods of remediation within the semester. The recommendation of traditional methods of remediation from [3] is to require or incentivize regular participation in enhanced advising activities, compress or mainstream developmental education with course redesign and to teach students how to become self-regulated learners. The findings in [4] is that the success rates from corequisite remediation indicate a more efficient instructional system for students who enter college academically underprepared. The literature in [5] suggests that modularization can afford students greater control over their learning experience by allowing them to control the pace at which they move through material. In addition, a modularized curriculum is intended to give students enhanced opportunities for mastery, as students can recycle through challenging content or review discrete areas where they need more practice.

The data from the study shows that the diagnostic placement test allows students to skip modules, creating opportunities to accelerate their progress through developmental requirements. The recommendations are to support student acceleration through triage and incentives and to target instructional support for students with the greatest needs.

In this paper we explore the question: can online modality be used as a platform to enhance and remediate in in-person classrooms, along with a prolonged time model to help an underprepared student to pass a course at their first try? We lay out a model based on the idea of incentivizing students who want to take on the challenge to master their deficiencies through second chances within the semester and then further carry them over the finish line of completing the course in their first try by prolonging the semester into an intersession. This helps students graduate on time; they do not fall behind because pre-requisite courses are incomplete. Most importantly they escape the vicious cycle of frustrations of failing over and over again had they registered for this course afresh.

...Frankly, I used to get tired, taking notes and doing homework each week. But your videos and explanation, it kept me engaged. It helped us to remain more engaged throughout the semester. I am thankful that you discarded the typical and traditional learning process.

Your lessons seemed much easier to remember. The reason is you presented the opportunity to relate the lesson with something we already knew. Every lesson and term you explained, you related it to a way I could understand. You brilliantly changed the idea of boring lectures.

No one can beat your enthusiasm. It may seem impossible to think college students could be alive, alert and attentive for an online class. We become enthusiastic because you were excited to teach. ...

--Student testimonial on the Online Course content and delivery.

Course Design

Model Concept:

At the heart of it is the following idea: currently, if a student fails a course this semester, they must take it over in another semester. Therefore, the student waits a whole long time until the next semester at the earliest, in this passage of time they forget everything, must start from scratch again, they often become frustrated because they feel they might know the stuff as they had taken it the previous semester. There is evidence that students fail multiple times under the current structure. We take a two-step approach to solve the problem. The first step is identifying the issues and customized and laser focused remediation to stabilize the student. The second step is to prolong the semester to seamlessly complete the remainder of the semester. We propose a January intersession course shell attached to the Fall course shell to complete the second step.

Problem to be Addressed:

Our target course is MAT 104, which is a Finite Mathematics course geared mainly towards Finance majors. Topics include matrices, linear programming, math of finance and counting and probability. The DFW rate for MAT 104 (data for Pace University, New York Campus from Fall 2015-Fall 2019, pre-pandemic) was upwards of 50%.

Also, the challenges of COVID-19 have also taken a toll in K-12 education, Mathematics education has taken a particular hit [25,28]. We see an increased number of math challenged students each year and will do so moving forward for some time to come. We want to get ahead of the curve and put mechanisms in place such as the second chance a path to success as proposed here to cope with the crisis that we see loud and clear.

The Plan:

Current state of affairs: If a student fails a course in a 14-week semester, the student must take it over in a subsequent semester. Therefore, the student waits a whole long time until the next semester at the earliest. In this passage of time, they forget concepts already learned and must start again. They often become frustrated because they feel they might know the concept as they had taken it the previous semester; and there is evidence that students fail multiple times under the current structure.

Our proposed remedy: (Our target course is MAT 104 which is a Finite Mathematics course geared mainly towards Finance majors. Topics include matrices, linear programming, math of finance and counting and probability)

Timeline:

Step 1: *The Second Chance Course shell with the following features* are proposed. Students are asked to stay in their section of MAT 104 until Exam 2 (which is approximately administered in the 10th week) before deciding whether they want to withdraw with the permission of the instructor due to poor performance. Upon withdrawal, they move over to an online asynchronous community course shell that is seeded with all the material of the course up to withdrawal date (i.e., ten weeks material of the course). Students will reside in this course shell up to end of semester, which is approximately four more weeks. Course shell is regulated by a program director who will customize the asynchronous content to individual needs. The course shell will provide asynchronous lecture video modules to strengthen the weakness of students. Asynchronous assessments and feedback will be provided weekly (there is a strict timeline for assessment completions to get up to par in the four remaining weeks.) At the end of the four weeks, the students will be given a chance to retake exams that they failed earlier in the ten week period. If they pass their retake of exam 1&2 in the 14th week, they will be granted permission to enroll in January intersession MAT 104, in which they will be responsible for completing the work of the remaining four weeks of the semester. Therefore, the purpose of Step 1 is customized and laser focused remediation.

Step 2: *January Intersession pilot MAT 104 asynchronous; the course shell is customized:* Successful students coming from the Second Chance Course shell from Fall semester will be accelerated to course materials that come after exam 2. Therefore, they can cope well with slower pace of the new material while still utilizing all the course time in the January Intersession. Traditional students will be introduced to the full range of the course at regular speed. We would guarantee a January running of the course to students who are in Second Chance. Therefore, the purpose of Step 2 is the prolonged time period added to the Fall semester in the January intersession in which they seamlessly continue and complete the course.

Second Chance: a Path to Success Features:

- Meaningful support is given to the math-challenged students who withdraw from the course. The second chance community course shell established in the 10th week of Fall semester helps them achieve mastery of skills and knowledge up to week 10 material by taking a second guided look at materials.
- Success was achieved by continuity of study and giving them the opportunity to take a slow-paced January intersession class for completing course successfully.
- Stay in the same graduation cycle.
- Future DFW rates from retakes of the course decreased and potential for retention and graduation rate improvement.

Distinguishing Characteristics: National trend for the status of support outside of class meetings to facilitate student learning in Mathematics courses is somewhat similar. The usual go to are Faculty office hours, perhaps peer tutoring available at a Math Resource Center or perhaps recitation classes. But the reality is that many of the math courses are run by adjunct faculty, who are contractually not obligated to give office hours at most institutions. Recitation sections and/or embedded tutors are subject to availability of funding. Nationwide trends of budget cuts over the past few years have resulted in services such as embedded tutors not where they need to be to support all the students who need it. As an aside, anecdotally, the recitation sections are often not well attended, and attendance declines over the semester. Students feel that the extra class meeting, which they don't see as linked to their grades, is more of a chore, given the multitude of things they are juggling. They are not mandatory. Math Resource centers do provide help to students who attend on a regular basis. Peer tutors are helpful in many ways. However, it is not obligatory for students to attend.

The online platform is an interesting and engaging platform for our digital savvy students. It has been used effectively by programs such as Khan Academy and CTY (Center for Talented Youth). However, it must be used effectively for the math challenged students to engage and see the value-added nature of that engagement. When the semester ends or you must Withdraw from a semester, the face-to-face classes end. However, an online platform does not know those boundaries, it can be kept rolling, giving customized remediations and prolonged time model, which is at the heart of the second chance model.

Whereas, the first part of the program delivered by online modality capitalizes on the customizing the remediation to the student's math deficiency, giving them a second chance through remediation and re-assessment, the second step helps prolong the semester on the online platform and helps the student to seamlessly complete the semester without going through the vicious cycle of re-registering for a failed course in a subsequent semester, starting afresh and going through the frustrations of going through the motions yet again unsuccessfully. Second Chance: a path to success hinges on using the above philosophy to appeal to the students and get them to be successful.

This is a fresh look which combines the strengths of the different methods discussed above. It is significantly different in the approach that includes customized videos; a Program Director who gives support and feedback; and a second chance for the students to be reevaluated, consolidate their knowledge and seamlessly move into the prolonged semester to complete the remainder of the course.

The Pilot:

The course design acknowledges the two separate cohorts, one that had taken the course before therefore candidates of the authentic second chance pilot (44% of the class) and a control group of students who had not taken the course before (56% of the class).

The second chance program was run in the January Intersession (following the Fall semester). The class was a Mix (asynchronous/ synchronous) and ran for 4 weeks. Here are actions taken to implement the pilot: the course was divided into 3 weeks, each week ended with an Exam (Exam 1, 2 and Final). The course was released a week before the start date of the January intersession.

The course was already laid out for the students on the date of release with customized video lectures, assignments and projects, all three weeks were completely populated. The students who were retaking the course (i.e. the students who were in the second chance cohort) were instructed to work on assignments (these were graded immediately), mock exams (solutions were made available in video format) for the first week to check how well they did. If they were on target to pass, they skipped ahead with their learning for the next week.

Being able to skip ahead in asynchronous mode was a key piece. They spent their time on what they were weak at. Exams were administered at the same time for the class for both cohorts.

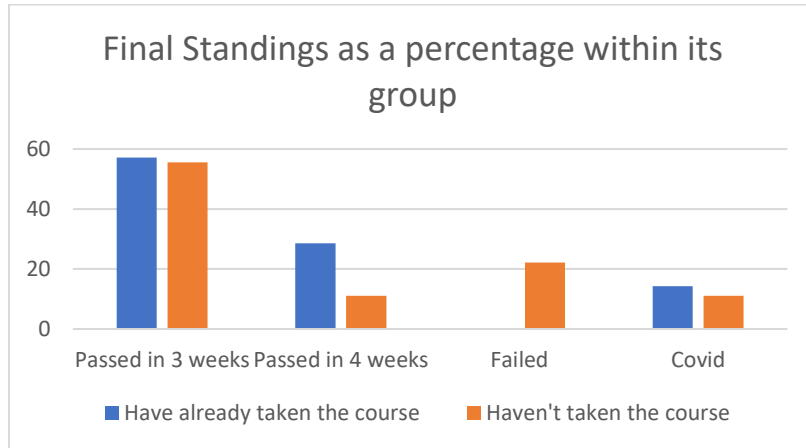
The fourth week was dubbed the "second chance week". The grades were released at the end of week 3. This gave everyone the option to re-take any exam they felt they did not do well in. The last week was customized to individuals, reinforcing each one's weakness through video lectures.

Means of communication are very important in mixed modality classes. Students were emailed profusely, chasing down each and every assignment submission, coaxing them to resubmit if we saw preliminary errors in assignments and projects. The idea here was that we help the students learn, not just be judged for their submissions. More technical questions were often answered with small video clips. Each student got individualized attention in the course, because the instructor freed up their lecture times by uploading video lectures. These videos are similar in feel to Khan Academy, with theory presented and problems worked out step by step. The big difference in these videos reflected the experience of the faculty members and their familiarity with their students who were their ultimate audience. The understanding of our own University students and delivering content at their level, just as the faculty would teach them if they were sitting in front of the faculty member in class was key to the success of these videos. The quality is why a student chooses the University, not just links to Khan Academy videos. The videos bring forth the essence of the University.

Key findings (Graph as a percentage of cohort):

- Nervous students who had failed the course earlier now passed, mostly in 3 weeks, a little more handholding was necessary for a couple in the category, and they did it in 4 weeks! 100% of this category passed. Students in this second chance cohort were demoralized when they started, but when we parted, they were more confident.
- Of the cohort first time takers of the course, the second chance fourth week clearly worked for 10% of the students, the set up so that they have the fourth week to patch up their weakness worked. This was our control group. They demonstrated the normal scenario, expected failure rate is about 30%-40%. Graph indicates about 20% failure, and about 10% that passed due to second chance applied to this cohort during the fourth week.

- COVID (or illness of at least 2 weeks) unfortunately affected students from each cohort, so they are not included in the discussion as they were out most of the semester.



Note Pass is defined by A,B, C grades. All our students in the second chance cohort who were not derailed by illness passed. This is a long way to come from the current state of affairs: if a student fails a course in a 14-week semester, the student must take it over in a subsequent semester. Therefore, the student waits a whole long time until the next semester at the earliest. In this passage of time, they forget concepts already learned and must start again. They often become frustrated because they feel they might know the concept as they had taken it the previous semester; and there is evidence that students fail multiple times under the current structure.

Summary: The second chance, a path to success, is a method of helping high risk students as soon as we identify them. It helps students achieve mastery of skills and knowledge to pass the course by offering continuity of the semester leading to a slower pace of course completion and targeted assessment to each student’s individual needs to help them work through their weakness. The problem is addressed by providing meaningful support given to the math-challenged students who withdraw from the course. The second chance community course shell helps them achieve mastery of skills and knowledge by taking a second guided look at materials under the watchful eyes of a program director who helps customize the course for each student through assignment-based feedback. Success is achieved by continuity of study and giving them the opportunity to take a slow-paced January intersession class to complete the original Fall semester course that the student had failed successfully. This process alleviates anxiety and helps them stay in the same graduation cycle. Future DFW rates from retakes of the course are decreased and there is significant potential for retention and graduation rate improvement for the students and the University alike.

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