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A WIP report on Seeking How to Best Enhance Engineering RPG Rates in a Post-Covid World: from alternative grading techniques, to blended modalities of online course delivery, to a newly created common Freshman Intro Course?

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Work-in-Progress: Seeking How to Best Enhance Engineering RPG Rates in a Post-Covid World: from alternative grading techniques to blended modalities of online course delivery to a newly created common Freshman Intro Course?

Abstract

This substantial work-in-progress report highlights one possible best practice to ameliorate the common struggle to retain students who progress efficiently to graduation at the undergraduate level within 4 to 6 years among engineering programs across the country for many years, if not decades. There are numerous and complex factors which affect retention calculations, with some not so easily measurable and thus even possibly quite debatable. Many in academia even discount some of the RPG (retention, progression, graduation) results due to a variety of reasons that severely affect RPG rates, such as: changing majors, transferring to another college, co-oping, among countless others. Regardless, a plethora of efforts have been explored to ameliorate the challenge of increasing high-quality engineering graduates, while at the same time not diminishing the academic rigor nor experiencing grade inflation. This struggle is often a delicate balance at most engineering institutions between faculty and administration, where both seek to identify the best practices and solutions for a problem that has persisted for a significant amount of time.

Moving into a post-Covid world, what are some best strategies for maintaining such high-quality learning effectiveness while also enhancing RPG? This is key especially given the rapidly and continually evolving technologies such as AI and numerous blended modalities of course delivery for vastly more flexible and diverse student populations. This work-in-progress paper will explore a variety of solutions employed and time tested from a rather large engineering college of almost 6000 total students at an R2 university, including a significant change to how the introduction to engineering discipline courses have transitioned.

Over many years it has been completely manifest and realized that all students have various learning styles where we seek to provide the diverse and flexible instruction delivery methods along with applicative hands-on learning opportunities for all. In the process, various technologies are explored where we also seek to stay abreast of the new tools becoming available. In addition, often alternative grading strategies and other best practices learned have been employed. One chief aspect of this work-in-progress paper will be to analyze the effects on student success using a particular alternative grading strategy and whether it can serve as any potential or additional key indicator to increased RPG and graduation rates. How students choose to engage technology with their engineering courses and the resulting outcomes to student success is also a factor, such as whether attending classes F2F (Face to Face), completely online via a Zoom and/or TEAMS platform, or through a hybrid, blended approach. Utilizing evolving technologies for course delivery has been experimented with by this author for over a decade plus, from early versions of Horizon Wimba in 2008, to Collaborate and Covid influences, among many others. This paper will consider results from data collected on how each modality of attendance students choose affected overall course grade averages. Additional feedback from the students will also be examined via input they provided through anonymous opinion polls.

The demand for increasing engineering graduates appears pervasive across the country although there have been some naysayers who disagree. For example, in the state of Georgia, there was only one other public institution offering undergraduate degrees in traditional engineering (CE, ME, and EE) until 2009 when resistance finally was no longer a majority opinion. Other states have also demonstrated that additional and increasing opportunities in engineering continue to expand our discipline with strength, while also continuing a legacy of strong programs historically elsewhere. At the same time, a focus on quality and quantity in preparing the future of balanced engineers is certainly a very desirable and worthy goal to pursue, such as with the recent focused theme of T.I.E - The Integrated Engineer at the annual 2024 ASEE conference. Many institutions offer a variety of common first year experience (FYE) intro courses. We recently discontinued our decades long discipline specific introductory courses of engineering and engineering technology such as EE 1000, ME 1000, ECET 1000, and the like by replacing them with a common FYE ENGR 1000 course. Students afterwards in a subsequent semester select a discipline specific 1001L lab course to take within their directly declared major. We commenced offering this new 1-hour overview of all engineering majors followed by the 1-hour discipline specific lab course in 2024, among many other ideas for seeking to enhance RPG rates. This is a tremendously collaborative undertaking involving countless dedicated and devoted hours by faculty and staff from all the engineering and engineering technology majors to launch. Hopefully, this will also serve to further enhance the awareness of the strengths for both Engineering Technology degree programs as well as Engineering programs. This paper also begins to analyze any early effects of this new approach and curriculum change to our RPG rates, along with the challenges, unexpected obstacles, and creative solutions encountered.

This WIP research primarily focusses on exploring whether a particularly employed contract grading" technique used for a decade plus in the EE 1000 course was helpful for enhancing RPG rates. Further, can this particular alternative grading approach serve as an indicator for such RPG rates moving forward with the new EE 1001L? This grading technique allowed students to choose where to concentrate their efforts among many diverse opportunities and will be detailed and fully delineated further in the paper. The intent of this grading technique was to significantly lessen the stress often associated with a transition to college, as well as to reduce the concern or worry about grades. Hopefully, this alternative grading system results in enhanced learning and critical thinking with less pressure to make or earn a particular grade. Instead, the motivation of seeking to learn complex new material was offered in a variety of ways using both traditional means such as quizzes and essays, as well as creative methods of group work and design project-based learning. Numerous and diverse aspects of the engineering profession are explored from basic circuit design prototyping and soldering, lab report documentation, spreadsheet manipulation, team building, engineering research, engineering research, etc.

After mining this monumental amount of data from thousands of students since 2012 with vital and significant support from our registrar’s office, it is anticipated that those students who were not focused on just earning a particular grade but instead were willing to attempt a variety of these alternative learning approaches with course averages exceeding 100%, will have a higher likelihood of a timely graduation within the confines of the RPG guidelines. Hopefully, some encouraging results for the future (both locally and beyond) will be implemented from this study, especially if the hypothesis proves any veracity.

Introduction

Are there worthwhile indicators that would accurately predict superior success for freshman university students pursuing an engineering career while navigating the challenges of an arduous, yet rewarding, degree in engineering? Attrition in undergraduate engineering degree programs has certainly been more significant than non-STEM majors for a very long time. Such RPG questions have been pondered and researched by a plethora of scholars, whom most all have earnestly endeavored to enhance both the quantity and quality of our engineering education.

Indeed, there are numerous best practices in the engineering profession, especially originating from within academia, which have been identified and implemented across numerous institutions in seeking to accomplish this lofty and admirable goal.[1] Involving a diverse group of constituencies beyond academia such as within government, military, and/or industry has been key in attracting and retaining students in engineering as well as determining if there truly is a need for an increased number of engineering graduates. There have even been varying opinions within these groups on whether there are sufficient offerings of undergraduate degree programs in engineering across our country. A particular case study and its results will be explored using a notable example with the state of Georgia will be explored. Collaborating and dialoging together to address this multifaceted challenge can only serve to provide more opportunities for our undergraduate engineering students to succeed.

This WIP research paper primarily focusses on exploring whether a particularly employed “contract grading" technique used for a decade plus in an introductory electrical engineering course was helpful for enhancing RPG rates. Further, did this particular alternative grading approach serve as an indicator for such RPG rates moving forward with a seminal curriculum change including replacing this 2-hour course with two 1-hour courses? This grading technique allowed students to choose where to concentrate their efforts among many diverse opportunities and will be detailed and fully delineated further in the paper. Some students exercised their strengths of test-taking abilities via quizzes and the final, while other students demonstrated leadership skills and focused instead on writing assignments and design projects. The intent of this grading technique was to significantly lessen the stress often associated with a transition to college, as well as to reduce the concern or worry about grades.

Hopefully, this alternative grading system results in enhanced learning and critical thinking with less pressure to make or earn a particular grade. Instead, the motivation of seeking to learn will be paramount where it is anticipated that such students who were not focused on just earning a particular grade will have a higher likelihood of a timely graduation within the confines of the RPG guidelines. In other words, such students instead were willing to attempt a variety of alternative learning approaches and assignments such that their individual course average well exceeded 100%. Hopefully, some encouraging results for the future (both locally and beyond), will be implemented from this study, especially if such a hypothesis holds any veracity.

Background

Many metrics and methods have been analyzed to increase engagement among students with the central idea of “retention” and then later expanding to RPG (retention, progression, graduation)

rates. This has been at the forefront of concerns and focused efforts highlighted over the last decade especially for engineering faculty, university administrators, industry partners, accrediting bodies, among others. One recent ASEE 2022 study[1] purports as many as over 4000 papers related to engineering RPG issues are published annually. Understanding the extremely diverse demographic of undergraduate engineering students it truly a tremendously difficult challenge[2]. Not only does the engineering profession experience all sorts of change and transition in quite a short order of time, but also our generations of students have continually evolved over time demanding different needs and wants for defining success in pursuing an undergraduate degree in engineering.

All of these issues, and more, are super critical to keep top of mind when addressing how to best improve undergraduate engineering RPG rates. In other words, there is certainly not a "one size fits all" solution to revolutionize RPG rates across the board. Applying a variety of best practices for improving RPG is undoubtedly a wise course of action where scholars and teachers learn new ways together to reach out and engage students better.[3] In addition, there are expressions of concern, skepticism, and even keen interest in how online modalities enhance or diminish RPG for our current generation of engineering students. For example, some may ponder whether there is or was even a need for growth or more engineering degree programs and graduates among states in our country and may argue that such concerns are not necessary.

Historical Review of one US State's Example Need and Demand for more Engineers

Until quite recently within the last couple of decades, the state of Georgia had only one public and one private institution with traditional engineering programs existing throughout all of the 20th century. Prior to 2009, the only public institution in the state of Georgia to offer traditional engineering degree programs that were also ABET accredited was Georgia Tech (also known as Georgia Institute of Technology). Several other institutions offered some niche engineering programs (also ABET accredited) such as SPSU (Southern Polytechnic State University) with Mechatronics Engineering, Construction Engineering, Software Engineering, among others including numerous undergraduate B.S. degree programs in Engineering Technology; GS (Georgia Southern) also with varying Engineering Technology B.S. degree programs; UGA (University of Georgia) with a BS degree in Agricultural Engineering with concentrations in particular disciplines including the traditional civil, electrical and mechanical. In addition, since the mid-1980s, the state of Georgia has had one private college (Mercer University) provide an additional path in Georgia for undergraduate students to pursue traditional degree programs in engineering. The table below summarizes each of these schools and highlights particular areas of interest for undergraduate engineering degree programs. All of these universities are all fully ABET accredited in the state of Georgia with now five higher ed institutions having engineering.

Engineering Institutions within the State of Georgia	Georgia Tech	Southern Polytechnic	Georgia Southern	University of Georgia	Mercer University
Year traditional engineering degree programs commenced	1901	2009	2011	2012	1985
Present enrollment *(approximate)* in undergraduate engineering	8,000	5,700	3,900	2,200	650
Graduate Degrees offered	MS and PhD	MS and PhD	MS	MS and PhD	MS

Table 1: Current characteristics of all institutions within Georgia offering engineering [4]

SPSU initially requested to start traditional engineering degree programs in the state of Georgia in the mid-1980s as well as the late 1990s from the University System of Georgia (USG) Board of Regents (BOR). At both times, SPSU's request was denied, despite sharing extensive documentation from varying constituencies (industry, government, academia, etc.) demonstrating the demand for more engineering degree programs in the state of Georgia. As soon as SPSU was granted traditional engineering degree programs in 2009, both UGA and Georgia Southern followed soon thereafter in the 2010s with their own traditional engineering degree programs.

After now more than a decade since the USG BOR granted permission to expand into undergraduate engineering degree programs, the data in the above table makes it clearly manifest that the demand for further engineering undergraduate degree programs in Georgia was direly needed where now all of these five tremendous institutions complement each other working cooperatively and collaboratively together, rather than competitively. Each institution offers numerous paths for student success in engineering both within and beyond Georgia with each possessing various strengths and weaknesses. Each of these five universities now amply provide a diverse and strong alumni of engineering, all with plans for continued growth. In Electrical Engineering alone, Southern Polytechnic has already graduated over 1000 students with the BSEE degree since only 2012. Other accolades for SPSU, UGA, Georgia Southern have also been apparent with a whole host of awards and recognitions, such as several from the GSPE (Georgia Society of Professional Engineers) recognizing many of its administration and faculty for expanding engineering so radically and quickly within the state of Georgia at all of these engineering institutions.

The Retention Challenge

With so many students interested in pursuing engineering undergraduate degrees, all of us in our profession have sought how to best retain students via so many RPG initiatives and ideas such that we now have such a plethora of excellent examples to model. Navigating through so many can be quite the challenging ordeal! New approaches are also worth considering even from the ideas of non-engineers, where they may work in one location or with one group of undergraduate engineering students, but not all. The idea of trying an alternative grading method to see if there was an impact on RPG was from the inspiration of an extraordinary English and Literature professor who was also our Honors program director starting in 2004. At that time, we were a small university with a total university enrollment under 4000 that embraced engineering and other technical, as well as liberal arts degree programs, with a close-knit faculty who all knew each other and engaged often in both small and large meetings and gatherings. Later, after practically doubling in size to an 8000+ student enrollment, we consolidated with a much larger university now numbering almost 50,000 total students which brought additional challenges to RPG, and yet this alternative grading method continued. Like many universities, we had a Center for Teaching Excellence (CTE) as most colleges and universities are adept to employ with hopes of fostering a sincere focus on quality teaching. One theme among countless studies in RPG related areas, has consistently shown that increasing the level of active engagement between students and faculty is key, and yet so many diverse learning styles present a challenge on how best to reach all of the masses of undergraduate students while not losing the interest of any, or very few. The CTE (or CETL, Center for Excellent in Teaching and Learning, etc.)

provides an internal opportunity for dialog where shared ideas often can even be effective across multiple and varying disciplines. Providing alternative approaches for various, diverse learning styles of students can truly be well brainstormed in such conversations. In addition, learning how to apply various in class and online learning modalities has proven helpful. Our Honors director presented a paper she had written along with her research on contract grading to our CTE in 2008. This intriguing inspiration was what launched the idea and thus implemented contract grading in a number of classes, especially when starting a new B.S.E.E. degree with offering a very first ever EE 1000 FYE course in 2009. This alternative grading approach has been consistently used in EE 1000 and now EE 1001L for over 15 years during boths every Fall and Spring semesters along with some summer terms.

Exploring potential RPG Solutions

Having taught EE 1000 virtually every semester since its inception, the same contract grading methods were employed and evaluated over the last several years where recently it was realized that students taking advantage of this creative grading method appear to be graduating in a more timely manner. Every student is most certainly unique such that RPG rule restrictions can be quite overbearing. However, allowing students with multiple and varying learning styles to be exposed to our discipline of engineering (with electrical engineering especially) in such an introductory course is critical for their potential success as observed by many in our profession.

Further, continued deliberations both in curriculum committees, as well as other adhoc gatherings, are useful in the continuous improvement of such a critical course. Applying the numerous recommendations from Raymond Landis' text of *Studying Engineering* to countless peer reviewed research papers[1] and presentations on enhancing RPG (while at the same time making certain to address all diverse student learning styles) is critical amongst all the strategies employed for helping invigorate and spark interest in engineering among our freshman and starting engineering students. Many of these new students are at a very precocious age. Many are still teenagers such that making a lifelong decision of choosing the best major can seem all too exhausting and intimidating.

It is clear that an abundance of methods and techniques should be used, along with energetic faculty as instructors, for such FYE intro to engineering courses and is super critical for the early launching success of our engineering students. Although a minority of students may already be motivated prior to enrolling in such a course, ensuring that the vast majority of students will also be enthusiastically engaged in their chosen engineering major can be quite the challenge. Hopefully, this novel contract grading method can provide a less stressful environment where learning can be enhanced for all the students participating in introduction to engineering courses.

Research Methodology

In an interest to motivate students to superior success and maintain an avid appetite for learning, the initial EE 1000 course (as well as most other ones that followed until the present time) had a contract grading approach offered to these budding engineering students as inspired earlier in the aforementioned research by our former and now retired Honors Director, Dr. Nancy Reichert.[5]

Since many students excel in some areas (and yet not all) with various learning styles, the overall EE 1000 grade was calculated using the below variety of evaluation procedures such that the total possible maximum average could be 120%. However, an A grade need only 89.5%!

Each of six categories were equally weighted at 20% each and include:

- Participation/Attendance/Homework/Readings (as well as online via D2L and Zoom)
- Formal Assignments (Drafting a Lab Report, Solar Design Project, IEEE Research paper)
- Quizzes (both in class pop quizzes as well as in the D2L LMS)
- Team Design Projects along with students creating multimedia video presentations
- Notebook Portfolio to include all their EE 1000 work in the semester along with a résumé
- Final Examination integrating all topics, concepts, applications discussed during semester

The most jarring, perhaps for students to hear, is that they only need to garner just 89.5% of the 120% possible! In other words, even an overall average grade of just below 75% (at ~ 74.6%) would ensure an A in the EE 1000 course. The anticipation is that the anxiety most students have of grades will be eased and ameliorated where rather a more serious focus is on learning with hopefully creativity not as easily stifled. This conclusion has certainly been consistently observed over a dozen plus years of this particular grading rubric being applied consistently every semester in the former EE 1000 course and now EE 1001L taught by this author. There have been an occasional additional section offered by other faculty not utilizing this alternative grading method. A future work to enhance this WIP is to analyze the RPG results of students taking these sections as recommended by a scholar reviewing an earlier draft of this paper.

Many of our 1000 intro courses in engineering focus on design projects and hands-on activities such as performing lab experiments in class together in EE 1000 and then collaboratively documenting the findings in a formal lab report. There is also a design project where students determine the best arrangement of solar cells to create a solar panel to particular specifications for building a solderable power supply that many students use in their future classes. It has been often observed that students continue to use this EE 1000 power supply even into their EE 4800 Senior Capstone project course. As phenomenal as this has been, we in EE have hoped to even find a more interesting design project that would attract the news media like our ME (Mechanical Engineering) department did for well over a decade with their students designing gauntlets, trebuchets, and air canons for launching pumpkins scores of yards (if not hundreds on some occasions). All of this certainly can be quite time consuming, as well as have significant cost associated with accomplishing them well.

Later, during the COVID pandemic where such courses were forced to be 100% on-line, it was quite a bit more challenging to ensure active student engagement in EE 1000. Thus, some pondering over this course ensued where it was realized that perhaps students who scored OVER 100% in EE 1000 with this contract grading rubric could be a possible indicator of success, not just for enhancing RPG but also to demonstrate their initiative even beyond graduation as alumni. Although many scholars discount examining what alumni do post-graduation for RPG evaluation, there could even be some merit in following the success of students' decades past graduation. Again, over the years, it has generally been shied upon to explore how graduates perform past their college experience, whether it be going on to graduate school or industry.

Whether students in EE 1000 who score above 100% serves as a possible prediction for RPG success is the crux of the hypothesis for this paper. Gathering and mining all sorts of research data commenced in haste and is quite arduous to determine how students with above and below 100% average grades in EE 1000 performed for RPG. Collaborating with our assessment office was required along with a whole host of forms providing permission to determine which students graduated in EE (or other majors). The other monumental sources of data were already backed up on numerous hard drives where all the detailed EE 1000 grade spreadsheets were analyzed. Unfortunately, when we consolidated with a new university, some of the assessment office data was not adequately stored such that there was less detailed information on our graduates prior to 2015. Regardless, after analyzing all of files and then collating them into a single detailed spreadsheet, some interesting findings are highlighted below. Continued research on this will certainly be even more focused with the advent of our new Intro Course hoping to increase RPG.

Preliminary Results

The table below shows the best summary of all the data mined and explored thus far on how **556** students performed in the EE 1000 course and whether it was a predictor of graduation success. With RPG defined at the USG (University System of Georgia) to be just 6 years, the most salient data available and profitable to study was for students taking EE 1000 prior to 2016 as 2022 graduation data is six years later. More data exists for the thousand plus students taking EE 1000 since 2016, which will be monitored and evaluated in coming years for a work in progress.

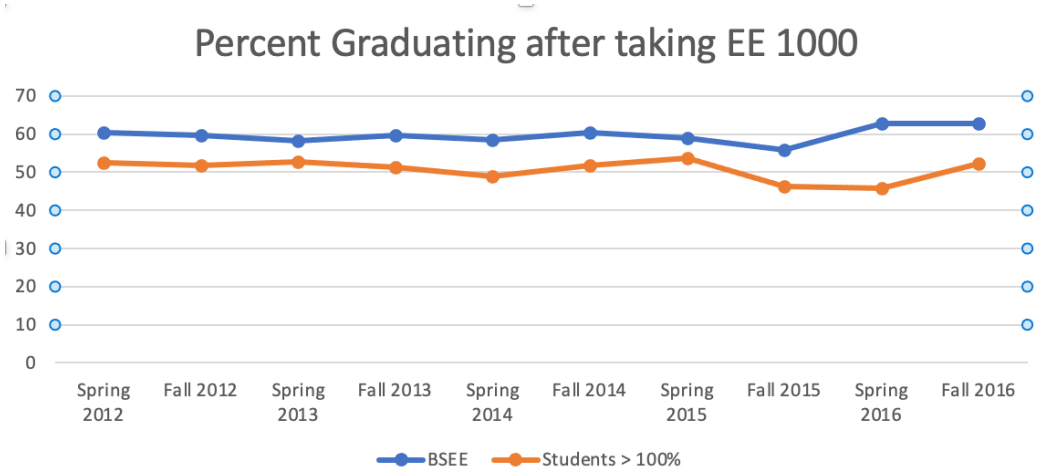
These results are also presented, both formally and informally, on campus and beyond to various constituencies. With the various caveats of RPG determination such as changing majors, transferring, among many more, this data does tend to focus on the more traditional path of students who generally do not change majors or transfer. This may explain how some institutions have higher RPG rates when their traditional to non-traditional student proportion tends to be much smaller. However, students who transfer, or perhaps take a gap year off from school, and then possibly return to campus are yet still provided a path for their aspirations and goals to succeed even if it is not graduation. This is especially more common at our institution.

EE1000 Term	Enrollment	EE Graduates	Other B.S.	No KSU B.S.	Above 100%	Below 100%	Class Average
Spring 2012	38	23 *(60.5%)*	10	5	20 *(52.6%)*	18	87.9%
Fall 2012	52	31 *(59.6%)*	14	7	27 *(51.9%)*	25	89.1%
Spring 2013	36	21 *(58.3%)*	9	6	19 *(52.8%)*	17	88.7%
Fall 2013	72	43 *(59.7%)*	17	12	37 *(51.4%)*	35	86.8%
Spring 2014	41	24 *(58.5%)*	11	6	*20 (48.8%)*	21	87.3%
Fall 2014	81	49 *(60.5%)*	19	13	42 *(51.9%)*	39	88.2%
Spring 2015	39	23 *(58.9%)*	8	8	21 *(53.8%)*	18	89.3%
Fall 2015	95	53 *(55.8%)*	25	17	44 *(46.3%)*	51	86.1%
Spring 2016	35	22 *(62.9%)*	6	7	16 *(45.7%)*	19	88.9%
Fall 2016	67	42 *(62.7%)*	10	15	35 *(52.2%)*	32	90.2%

Table 2: Summary of RPG Data for 556 students in EE 1000 from registrar office data analysis[6]

In analyzing the above data, it is helpful to observe the trend of the percentage of EE graduates over the semesters of EE 1000 taken as well as those students who scored above the 100% average in the EE 1000 contract grading approach. There are quite a number who still graduate

even without an A in EE 1000, yet it is not as prevalent. Further, there are 5 to 10% consistently within the above 100% average who choose a to graduate under a different major than a BSEE.



The following table summarizes all of the alumni who graduated with the BSEE degree from its inception until 2021. These two tables certainly do not coincide or correlate data where it is provided to be informative only. There are even students who graduated who never have needed to take EE 1000 and may have transferred into the major. Regardless, the total of over 1,000 EE graduates is significant sample sizing over the years and certainly informative, highlighting also a particular and precise demand for additional Electrical Engineering graduates in Georgia.

SPSU Grads	EE Graduates	Annual Total		KSU	EE Graduates	Annual Total
Spring Semester 2012	9			Spring Semester 2017	32	
Summer Semester 2012	6			Summer Semester 2017	12	
Fall Semester 2012	21	36		Fall Semester 2017	42	86
Spring Semester 2013	63			Spring Semester 2018	54	
Summer Semester 2013	6			Summer Semester 2018	18	
Fall Semester 2013	51	120		Fall Semester 2018	46	118
Spring Semester 2014	66			Spring Semester 2019	40	
Summer Semester 2014	21			Summer Semester 2019	8	
Fall Semester 2014	90	177		Fall Semester 2019	33	81
Spring Semester 2015	72			Spring Semester 2020	49	
Summer Semester 2015	42			Summer Semester 2020	19	
Fall Semester 2015	35	149		Fall Semester 2020	48	116
Spring Semester 2016	42			Spring Semester 2021	50	
Summer Semester 2016	17			Summer Semester 2021	18	68
Fall Semester 2016	41	100		**TOTAL EE Graduates for all Years**		1051

Table 3: Summary of all EE Graduates provided by our registrar's office[6]

Conclusion

Although there appears to be some potential correlations relating increased graduation likelihood for students scoring above the 100% threshold in EE 1000 using this alternative contract grading approach, further study is certainly needed. It is noteworthy and quite remarkable that about half of the students who took EE 1000 seek to do very well with their average well above 100%. Surprisingly, there are still students who score letter grades of C and D along with even a few F's in this introductory course with this creative scoring rubric employed. The "Above 100%" category of students do turn out to be mostly EE graduates; however, about 10 to 15% of them graduated as non-EE majors. Very often over 50% did much more than the minimum for an A!

Hopefully, the drive and motivation of students is spurred on by the opportunity to not worry about a particular grade, yet just seek lifelong learning. Other avenues to explore are also quite possible such as are students more likely to succeed in engineering at a smaller university versus larger? Perhaps other factors and variables affected graduation rates, such as starting a Computer Engineering BS degree in 2019 which could possibly explain the slight enrollment decrease in that year? Some students may even have other commitments outside of school where grades are not as critical to them? Thus, it is almost impossible to conclude with certainty.

Continued results of actively involving students early in design courses has truly been observed to be beneficial. Hands-on, applied design projects conducted early in an introductory engineering course is certainly critical for maintaining student interest and motivation. Among the various ideas employed to foster improving our quite abysmal RPG rates, this idea certainly has not been the most popular. Convincing others to consider trying this contract grading approach may prove to be challenging. Further, the idea of some students just flippantly pondering or choosing an engineering major just to try it out, with not fully comprehending all that it entails, is neglected. However, it is encouraging to note that some have commented that this research focus is more on how instructors and professionals can offer additional motivation and demonstrate how truly exciting and rewarding engineering can be, rather than identify what educational barriers or lack of prior scholastic preparation was available among students before enrolling in engineering degree programs. This is often sadly the more typical punitive approach.

Does this alternative contrct grading method encourage sincere motivation and drive for students where their curiosity and creativity continue throughout both their academic journey and beyond? Hopefully so, but regardless, the desire should consistently be to continue providing an engineering education that is engaging and ensures students are placed with the highest, utmost attention along with a paramount emphasis for tremendous potential and lasting success. Regardless, this contract grading system appears to at the very least dissipate stress and anxiety for incoming engineering students, and optimistically may lead to further enhanced learning.

[1] Gloria Fragoso-Diaz, Billy Gray "An Analysis of Student Retention Efforts in Engineering Technology Programs", Paper ID #36933, ASEE Conference, 2022.

[2] A.M. Lucietto and S. E. Leach, "Main Campus and Remote Campus Engineering Technology Students: How Are They Different?", 2017. 2017 ASEE Annual Conference & Exposition, Columbus, Ohio.

[3] Robin L. Flanigan , "Engineering Students Quit, But Retention Tactics Abound", ASME, April 10, 2024.

[4] USG Enrollment Reports, https://www.usg.edu/research/enrollment_reports

[5]Nancy Reichert, "Practice Makes Perfect: Contracting Quantity and Quality," *Teaching English in the Two-Year College*, v31 n1 p60-68 Sep 2003

[6] Institutional Registrar Office data